Navigation Improvement Study
Detailed Project Report and
Environmental Assessment

Wood Island Harbor
Biddeford, Maine

US Army Corps
of Engineers
New England Division

APR 1990

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13. ABSTRACT (Maximum 200 words)
This report presents findings of the navigation conditions in Wood Island Harbor, Biddeford, Maine. A shoal area has formed across a portion of this natural entrance channel which passes through Wood Island Harbor to Biddeford Pool. This continued shoaling has resulted in tidal delays and grounding damages to the commercial fishing fleet as fishing vessels attempt to transit the harbor during times of low tide. Recent study of the area find the top of the shoal to be at a depth of 6 feet below mean low water (MLW). The selected plan consists of providing a navigation channel (4,200 feet long, 100 feet wide and 10 feet deep at MLW) from deep water in Wood Island Harbor to a point just inside the Gut at Biddeford Pool, which would require the removal of 16,000 cubic yards of sand from the shoal area through use of a hydraulic dredge. The dredged material would be pumped for disposal, 1/2 mile to an inter-island sand bar between Basket and Stage islands. The project would result in a benefit to cost ratio of 1.7. The Division Engineer finds that there are no significant environmental impacts expected as a result of the proposed plan. Therefore, Federal involvement in the navigation improvements at Wood Island Harbor is recommended.

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WOOD ISLAND HARBOR
BIDDEFORD, MAINE

NAVIGATION PROJECT

DETAILED PROJECT REPORT
AND
ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

EXECUTIVE SUMMARY

This report presents findings of the navigation conditions in Wood Island Harbor, Biddeford, Maine, which are the results of a study to determine the feasibility of Corps involvement in providing modifications to the existing general navigation facilities at Biddeford Pool. A natural entrance channel passes through Wood Island Harbor to Biddeford Pool. However, a shoal area has formed across a portion of this channel. Most recent surveys of the area find the top of the shoal to be at a depth of 6.0 feet below mean low water (MLW). This continued shoaling has resulted in tidal delays and grounding damages to the commercial fishing fleet as fishing vessels attempt to transit the harbor during times of low tide. Several alternatives were developed and evaluated that would provide channel access through Wood Island Harbor. After analyzing the alternatives, it was determined that Plan B provided the optimum plan of improvement.

The selected plan consists of providing a navigation channel from deep water in Wood Island Harbor to a point just inside the Gut at Biddeford Pool. The channel would be approximately 4,200 feet long, 100 feet wide and 10 feet deep at MLW. This plan would involve removing 16,000 cubic yards of sand from the shoal area through use of a hydraulic dredge. The dredged material would be pumped for disposal, approximately 1/2 mile to an inter-island sand bar between Basket and Stage islands. The total cost for the recommended plan, based on October 1989 price levels, would be $245,000. Annual benefits, based on October 1989 price levels, would be $50,000 as compared to annual costs of $29,700 resulting in a benefit to cost ratio of 1.7. Local interests would be required to contribute $47,000 of the first cost of the Federal project. These cost sharing requirements are as specified in the Water Resources Development Act of 1986 (Public Law 99-662).

Required future maintenance dredging would be accomplished by the Federal government contingent upon the availability of maintenance funds, the continuing justification of the project and the environmental acceptability of maintenance activities.

The Division Engineer finds that provision of a Federal navigation project in Wood Island Harbor, Biddeford, Maine would result in significant economic benefits to the commercial fishing fleet and the local economy, while exceeding annualized costs. As documented in the Environmental Assessment, there are no significant environmental impacts expected as a result of the proposed plan. For these reasons, Federal involvement in the navigation improvements at Wood Island Harbor is recommended.

WOOD ISLAND HARBOR
BIDDEFORD, MAINE

RECOMMENDED PLAN

PROJECT SUMMARY
(October 1989 price levels)

GENERAL NAVIGATION FACILITIES	
(CUBIC YARDS REMOVED FOR GNF)	(16,000 cy)
CONSTRUCTION COST INCLUDING CONTINGENCIES	$175,000
ENGINEERING AND DESIGN	22,000
SUPERVISION AND ADMINISTRATION	40,000
FIRST COST	$237,000
NAVIGATION AIDS	$ 8,000
TOTAL PROJECT COST	$245,000
ANNUAL COST	$ 29,700
ANNUAL BENEFITS	$ 50,000
ANNUAL NET BENEFITS	$ 20,300
BENEFIT COST RATIO	1.7
COST APPORTIONMENT:	
NON-FEDERAL COST SHARE (20%)	$ 47,000
FEDERAL COST SHARE (80%)	$190,000

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1.0 INTRODUCTION

This Detailed Project Report (DPR) is the result of an engineering, economic and environmental feasibility study of navigation improvements in Wood Island Harbor, Biddeford, Maine.

Wood Island Harbor and the Biddeford Pool are located immediately south of the Saco River mouth, at the end of Fletcher Neck, about 15 miles south of the city of Portland. The harbor is located about 7 miles southeast of the center of Biddeford, a southern Maine coastal city with a 1980 population of 19,638. Access to Biddeford is provided by Interstate 95 and U.S. Route 1. Access to Wood Island Harbor and Biddeford Pool is provided by Maine Routes 9 and 208.

Wood Island Harbor, as shown in Figure 1, is encompassed by Fletcher Neck to the south, Hills Beach to the west and by five islands of various sizes to the north and east. Biddeford Pool, a large protected tidal basin slightly less than one square mile in size, is reached through a narrow gut at the southwestern end of Wood Island Harbor. High tidal velocities have scoured the gut and a small area of the pool immediately inside the gut to depths of 10 to 20 feet at mlw.

This study was requested by the city of Biddeford in a letter dated 23 April 1981. The letter requested that the Corps of Engineers investigate the feasibility of Federal participation in improving the navigation conditions in Wood Island Harbor and Biddeford Pool. A Reconnaissance Report completed in 1982 concluded that a further detailed study of the navigation conditions in Wood Island Harbor be carried out. This DPR is a summary of that detailed study.

1.1 Study Authority

This DPR is prepared and submitted under the authority and provisions of Section 107 of the 1960 River and Harbor Act, as amended.

1.2 Scope of Study

The scope of this Detailed Project Report provides for the following:

- Identifying existing conditions and historical trends within the study area,
- Determining the navigation problems and needs of the area,
- Determining the most probable future condition without Federal improvements,
- Developing alternative improvement plans,
- Evaluating and comparing the engineering, economic, environmental, and social impacts of the alternative plans, with respect to the future condition,
- Recommending improvements that are implementable, economically feasible, environmentally and financially acceptable, and socially beneficial.

The geographic scope is:

- o The areas of Wood Island Harbor and Biddeford Pool,
- o Areas of possible impacts beyond the immediate vicinity of Wood Island Harbor, including the dredged material disposal site and the areas from which resources are harvested by the commercial fleet.

1.3 Prior Studies and Improvements

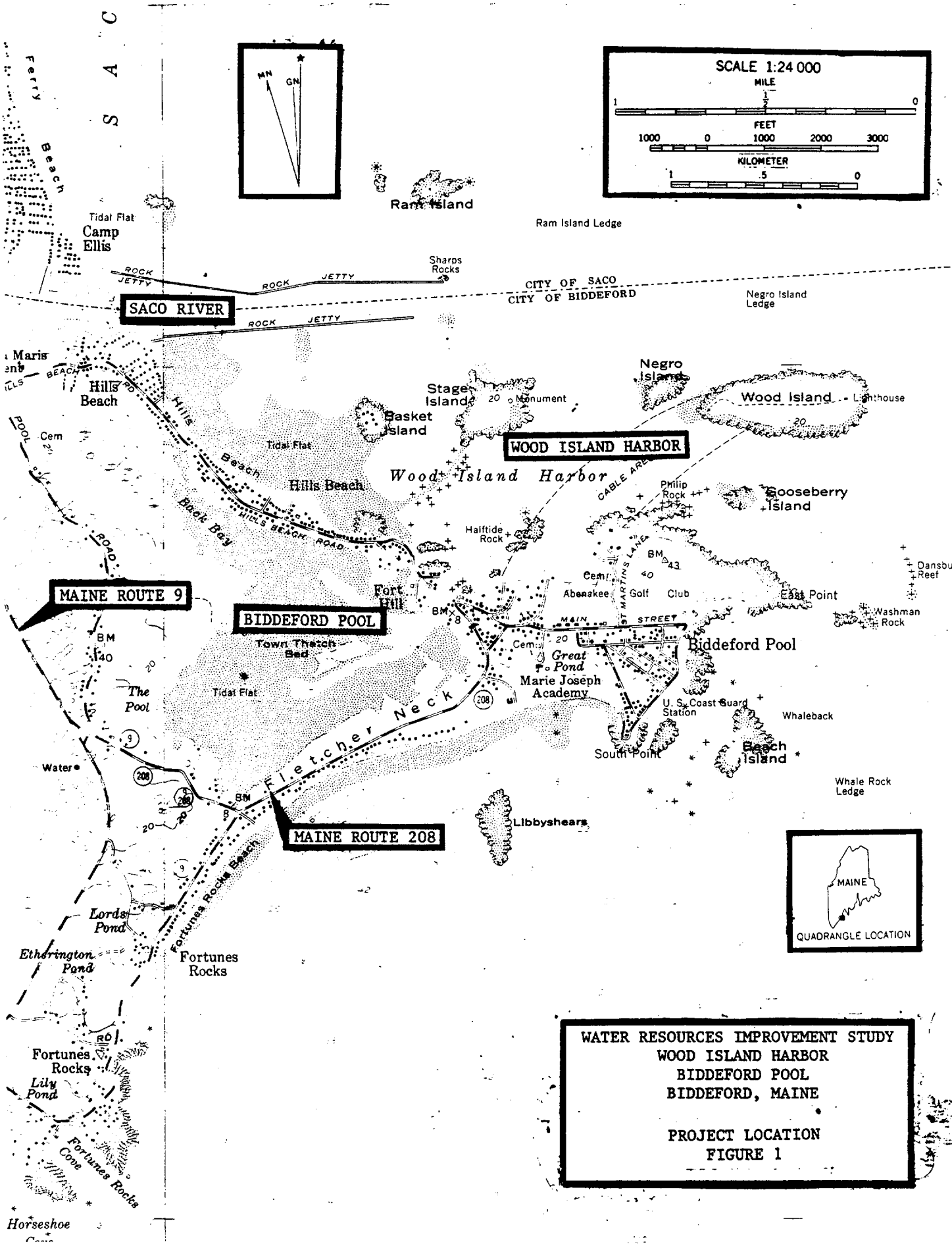
Federal interest in Wood Island and the Biddeford Pool began with a study that was completed 15 March 1946. This study and a subsequent survey report published 31 January 1949 found that several desired improvements lacked economic justification to permit Federal participation. These included an entrance channel 400 feet wide and 8 feet deep at mlw; an 18-acre 6-foot deep mlw anchorage along the northwest channel limit; and a rubblemound breakwater in Biddeford Pool to protect the anchorage and wharf area from ice damage.

The survey report did recommend that three navigation improvements be constructed within the Biddeford Pool. These included a 10.2-acre, 6-foot deep mlw anchorage located about 800 feet inside of the entrance to Biddeford Pool, an adjoining 2-acre mooring basin at the wharves on the south side of the gut and an array of three rubblemound icebreakers to protect the mooring basin. The improvements recommended in the 1949 survey report were authorized on 17 May 1950. Construction of the anchorage, mooring basin, and icebreakers was completed in 1956. The first cost of construction of the original project was $136,000 of which local interests contributed $12,000.

A survey-review of reports authorized in August 1960 and completed in August 1967 recommended modifications to the existing Federal project. The report found two plans of improvement to be economically justifiable. The first entailed expansion of the existing 6-foot deep mlw anchorage in the Biddeford Pool by an additional seven acres to provide a total anchorage area of 17.7 acres. Also found to be economically justifiable was a plan to construct a 150-foot wide, -8-foot mlw entrance channel which would extend about 3,000 feet southwest from deepwater in Wood Island Harbor to the gut at the entrance to Biddeford Pool. These improvements were not implemented as the city of Biddeford was unable to provide its share of the initial project costs estimated at $96,000.

The existing Federal project, shown on Figure 2, is the result of the 1950 authorization.

With the exception of shore facilities such as wharves, piers, and docks, there have been no improvements to navigation constructed by parties other than the Federal Government. Several years ago, the local fishermen's association used a loan from the Farmers Home Loan Association to upgrade and improve Fishermens Wharf at Biddeford Pool.

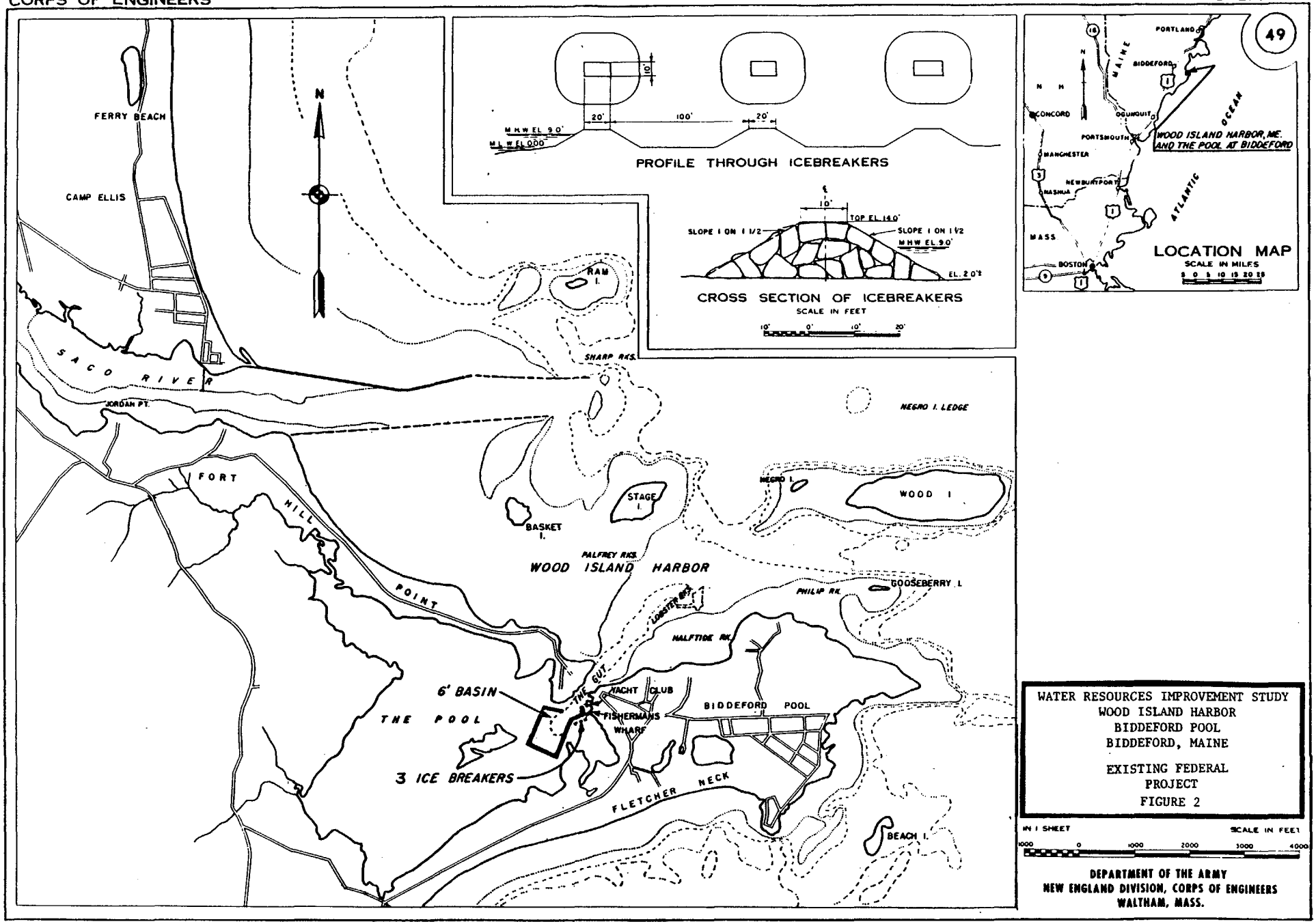


WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR
BIDDEFORD POOL
BIDDEFORD, MAINE

PROJECT LOCATION
FIGURE 1

CORPS OF ENGINEERS

U. S. ARMY



WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR
BIDDEFORD POOL
BIDDEFORD, MAINE

EXISTING FEDERAL PROJECT

FIGURE 2

IN 1 SHEET

SCALE IN FEET

1000 0 1000 2000 3000 4000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

1.4 Study Participants and Coordination

The preparation of this report required the close cooperation of Federal agencies, state and local government agencies, elected officials of the state and local governments, local commercial fishermen, and interested individuals. The city of Biddeford is the Project Sponsor. Record of public involvement, agency coordination, and project correspondence are contained in Appendix 4.

1.5 The Report

This DPR summarizes the investigation of alternatives for providing navigation improvements in Wood Island Harbor. The initial steps in the study included a comprehensive inventory of available information, performance of hydrographic surveys, environmental testing and sampling, and preparation of base plans. Extensive efforts were expended in contacting public officials to provide information and seek input in the study process. Based on these efforts, planning objectives and constraints were developed and plans formulated. These plans were developed and evaluated in coordination with state authorities and the final alternative plans were selected for detailed study.

2.0 PROBLEM IDENTIFICATION

This portion of the report discusses the nature and scope of the problems necessitating navigational improvements, and establishes the planning objectives and constraints that direct subsequent planning tasks.

2.1 Existing Conditions

Wood Island Harbor is located on the southern coast of Maine within the city of Biddeford, York County. The area is bordered to the east and south by the Atlantic Ocean, to the west by the cities of Biddeford and Saco, to the north by Saco Bay. Wood Island Harbor and the surrounding location can be found on the U.S. Geological Survey Map entitled "Biddeford Pool", or on the National Ocean Survey Chart #13287 entitled "Saco Bay and Vicinity".

The Wood Island Harbor area is located in one of Maine's busiest tourist areas. Old Orchard Beach, Ferry Beach and Scarborough Beach are all nearby and continue to attract large numbers of summer tourists. Whereas Biddeford is not a center for this tourist activity, the city has been affected with respect to local real estate. The real estate industry has grown substantially as the demand for vacation property has worked its way up the southern coast of Maine. As the value of real estate rises and the population expands, increased tax revenue provides more capital for municipal projects. The demand for property has also helped bring additional jobs, income and construction to the city.

The rapid rise in the real estate market has had its drawbacks. The increasing property values have led to increased property taxes. The Biddeford area has traditionally been a lower-wage based market. This increase in taxes could present problems in the form of slowed economic growth. With an increased population, the city is also feeling the pressure to update and/or expand its utility and traffic services.

The economy of the city of Biddeford has been based primarily on manufacturing. Local factories have produced plastics, machinery and electronic equipment. With the increased tourist market the area's economy has seen an increase in professional, entertainment and food service opportunities.

Although the port at Biddeford Pool is not very large it does play a significant role in the local ocean front industry. York County produces a very low percentage of the state's commercial fishing yield. However, of the fish landed in this county, over 50% of it can be accounted for through the Biddeford Pool fishing industry. Recreational boating activity has increased at an alarming rate. As traditional anchorages in this part of Maine continue to be overburdened, the Biddeford Pool mooring areas have grown in significance.

The commercial fishing operations based at Biddeford Pool are in a prime location and have easy access to Saco Bay and the Gulf of Maine. The commercial fleet consists of 23 year round vessels. Three of these vessels are large draggers/trawlers while the remainder of the fleet is made up of lobster boats. The draggers make approximately 60 trips a year

with each trip taking several days. The lobster vessels, five of which are outfitted for gill netting, make approximately 230 day trips during the year, fishing in the immediate area around Wood Island Harbor. The commercial vessels find anchorage in the Federally constructed basin inside Biddeford Pool.

The Biddeford Pool yacht club operates the recreational facilities in the harbor area. The fleet is comprised of 78 vessels. The recreational boating season consists of approximately 120 days a year. Most of the recreational vessels are moored in the Wood Island Harbor anchorage, located just south of Stage Island. The inexpensive cost of joining the yacht club attracts more boaters every year. However, mooring space is limited and therefore many boaters are on a waiting list.

The dominant land use in the vicinity of Wood Island Harbor continues to be a combination of seasonal and year-round housing. The Biddeford Pool area is part of a peninsula that forms the southern boundary of Saco Bay. To the immediate north and south of Biddeford Pool prime beach-front property can be found at Hills Beach, Fletcher Neck and Fortunes Rocks Beach. These beach areas are lined by several seasonal homes. The village of Biddeford Pool itself contains quite a few year-round housing units.

The immediate project area has several commercial properties. The village of Biddeford Pool provides a seasonal golf and tennis club, located southeast of Wood Island Harbor. The Biddeford Pool Yacht Club owns and maintains a wharf at the entrance to the gut. The Biddeford Pool Fisherman's Wharf is located just inside the pool. A public launching ramp is located on the southeast side of Wood Island Harbor. Several private docks and piers are located around the pool and the harbor. Wood Island Harbor's fishing success over the years has been due to the Fishermens Association based at Biddeford Pool.

The Biddeford Pool is a tidal lagoon with approximately 340 acres of total surface area at mean high water. The study area has a mean tidal range of 8.7 feet. This area of southern Maine is composed of rocky coasts and long beaches lying between low head-lands on the coast, while inland low-lying areas bordering saline ponds and salt marshes characterize the area. Entrance to the Pool begins with passage through Wood Island Harbor and then the gut (see Figure 3). The island protected waters of Wood Island Harbor are generally less than 12 feet deep, except in the outer edges of the harbor.

The existing Federal project in the Wood Island Harbor area consists of a 10.2 acre, 6-foot deep mlw anchorage located approximately 800 feet inside Biddeford Pool. The Federal project also includes a 2-acre mooring basin at the wharf area located on the south side of the gut, and three rubblemound icebreakers to protect the mooring baisn. A complete plan of the Federal project can be seen in Figure 2.

The three Federally constructed rubble mound icebreakers completed in 1956 are located just south of the existing maneuvering basin. These

structures were designed to break up ice flowing from the south and southeast which caused damage to wharves and piers located in the gut area. However, since their construction, natural siltation and disposal of maintenance material dredged from the immediate area, have filled in the area behind the structures. As a result of this action, ice formation and flows from this area have diminished and rendered the icebreakers virtually obsolete. Local officials have expressed an interest in abandoning the structures to provide space for the construction of expanded docking facilities to accommodate additional deep draft fishing vessels.

2.2 Problems and Needs

The navigation problem in Wood Island Harbor is that a shoal has grown across the natural channel. This shoal had minimum depths of -9.0 feet mlw in 1947 and -7.0 feet in 1967. Today the top of the shoal is at -6.0 feet mlw and even shallower depths occur during periods of extreme low tide. This continued shoaling has resulted in tidal delays to commercial vessels attempting to transit the harbor during lower stages of the tide. There has also been an increase in vessel damage as several vessels have grounded on this shoal.

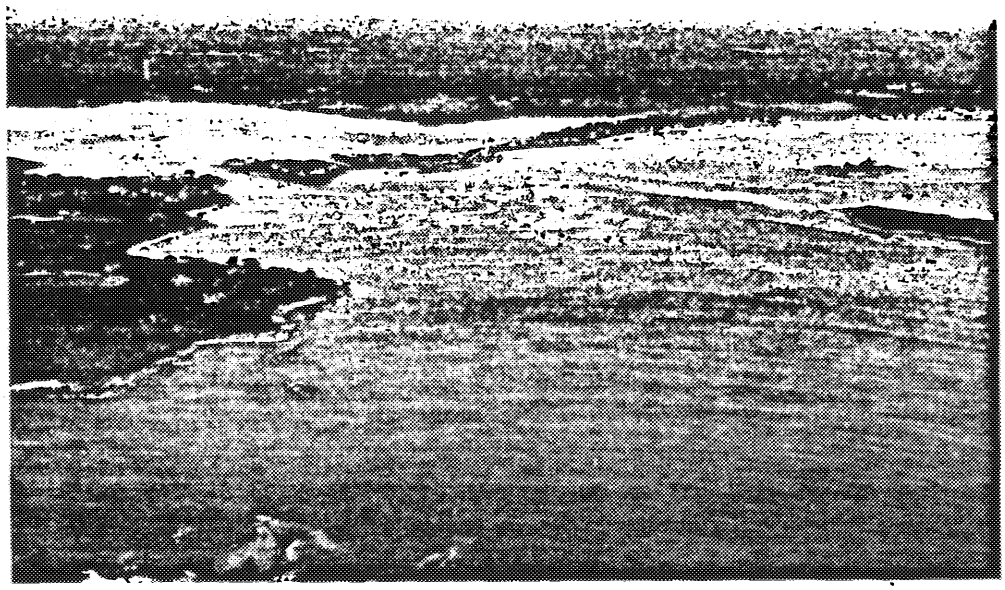
An increase in the size of the seasonal recreational fleet has led to a condition of anchorage overcrowding during the recreational boating season. Overcrowding in the existing Federal anchorage has also been compounded by shoaling in of the area. The excess amount of boats are being moored in the naturally existing deep water anchorage located in Wood Island Harbor. However, this area does not provide the vessels protection from the open ocean that Biddeford Pool does. Crowding in the Biddeford Pool anchorage results in chaffing and grounding damages to moored vessels and unsafe maneuvering within the anchorage area.

Ice floes and chunk ice in the pool anchorage present a major winter problem. Severe icing conditions when coupled with tidal flow through the gut and anchorage force many fishermen to quit operations during times of severe icing. The ice flows into the existing Federal anchorage from both sides of the saltmarsh island just west of the basin area.

2.3 Conditions If No Federal Action Is Taken (Without Project Condition)

If no Federal action is taken to improve the navigation conditions at Wood Island Harbor, the present conditions and current trends will continue.

Without improvements, the efficiency of the commercial fleet will continue to be impaired by increasing tidal delays and groundings due to shoaling in the channel. The Fishermen's Wharf has been updated to handle larger vessels. The wharf area has recently been dredged in conjunction with Corps maintenance work in the Pool. In order to take advantage of the 200-mile fishing limit several fishermen have invested in larger, more modern vessels . Several fishermen have also rigged their lobster vessels with gill-netting equipment so as to expand their fishing operations.



View to the West - Wood Island Harbor with Biddeford Pool in the background

View to the North - Biddeford Pool and the Gut with Basket Island and Stage Island in the background

AERIAL PHOTOGRAPHS

WOOD ISLAND HARBOR
BIDDEFORD, MAINE

Photos taken August 1986

FIGURE 3

However, without proper channel depths, fishermen will continue to find it difficult to operate out of Biddeford Pool and would seek to transfer to a more adequate port if a nearby one were available. Those fishermen who choose to continue operations during times of severe icing would continue to experience damages due to chunk ice chaffing and sheet ice collisions. It is apparent that as the fleet continues to grow in vessel size as well as number, these navigation problems will intensify thereby hindering the local fishing industry's efficiency.

The without-plan condition is a continuation of the existing condition for the recreational boats as well. Most of the vessels comprising the recreational fleet have small enough drafts and would remain unaffected by the channel shoaling for several years to come. The Biddeford Pool Federal anchorage recently underwent maintenance dredging by the U.S. Army Corps of Engineers. This should provide some much needed mooring space and eliminate many of the grounding damages experienced in the Pool. However, overcrowding of this anchorage during the summer season will continue to lead to boat chaffing damages of moored vessels and unsafe navigation conditions.

Funding from interests other than the Federal government are not available for the navigation improvements needed in Wood Island Harbor and the Biddeford Pool. City officials have stated that the cost of the needed improvements is greater than their means to fully fund. Therefore, Corps involvement is necessary in order solve these problems.

2.4 Planning Constraints and Objectives

Planning constraints are those parameters that limit the implementation of any proposed plan of improvement and serve to eliminate from consideration all those possiblities that offer no acceptable degree of satisfaction. These constraints can include natural conditions, economic factors, social and environmental considerations and legal restrictions.

In the case of Wood Island Harbor improvements, the major constraints can be identified as natural. Wood Island Harbor is bound to the north by several islands and an extensive sand bar system. It is bound to the south by Biddeford Pool village.

In the case of Biddeford Pool improvements, the major constraints can be identified as natural and environmental. Within Biddeford Pool, additional anchorage space is very limited by the naturally low water depths outside of the existing anchorage. In addition, due to the material to be removed from the Pool, any improvement plans would require special disposal considerations.

The Federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

a. Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.

b. Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

Several planning objectives were identified which specifically address the navigation problems and needs of Wood Island Harbor. These objectives are:

- Reduce the cost of commercial fishing operations for the Biddeford Pool fleet during the 1990-2040 period of analysis.

- Contribute to safer conditions for the commercial fishing fleet in Wood Island Harbor during the 1990-2040 period of analysis.

- Reduce projected without-project tidal delays for commercial navigation in Wood Island Harbor during the 1990-2040 period of analysis.

State and local objectives for the project area include the continued development, management and success of the Biddeford Pool as a base for commercial fishing. Recent improvements to the Fishermen's Wharf as well as improvement dredging of the berthing areas around the wharf indicate the committment, on the part of the non-Federal parties involved, to these objectives.

3.0 PLAN FORMULATION

The consideration of the problems and needs within the study area led to the formulation of alternative plans. These plans are designed to achieve the planning objectives, and are developed with regard to the planning constraints and objectives previously identified. State and local sponsor objectives are important considerations in the evaluation of alternative plans.

3.1 Plan Formulation Rationale

As one looks at the harbor it becomes apparent that the logical area for improvement is that place that currently handles deep draft vessels. The only area capable of this is the natural channel running through Wood Island Harbor from the gut to deep water.

The logical choice for anchorage expansion would be around the existing anchorage in Biddeford Pool. The deep water area used now as an anchorage in Wood Island Harbor does not offer protection from the open ocean as does Biddeford Pool. Within the Pool, as one proceeds west and north away from the existing basin the average depth decreases appreciably. Therefore, the obvious area for anchorage expansion would be around the existing Federal anchorage. This would take advantage of the natural deep water area of the Pool which would in turn require less dredging of material. The addition of icebreakers to the northern and western limits of this expanded anchorage would provide for protection against winter ice flow. During the initiation of this Detailed Study, these general features were incorporated into the project. However, a suitable, nearby disposal site could not be located for the Biddeford Pool dredged material. The amount of fines found in the material excluded it from being used as beach fill. The distance and subsequent cost of disposing the material at the Cape Arundel Disposal Site eliminated ocean disposal as an option. The lack of a suitable disposal site for this dredged material necessitated removal of the Biddeford Pool improvements from the scope of study. Therefore, this report focuses only on the Wood Island Harbor navigation improvements.

The formulation of plans for navigation improvements at Wood Island Harbor are based on a standard set of criteria. Alternative plans must be complete in that they provide and account for all necessary investments or other actions to ensure the realization of the planned effects. Alternative plans must be effective so as to alleviate the specified problems and achieve the specified opportunities. Alternative plans must be efficient, demonstrating a cost effective means of alleviating the specified problems and realizing the specified opportunities. Alternative plans must also be acceptable to state and local entities and the public and be compatible with existing laws, regulations, and public policies.

Each alternative is considered on the basis of its effective contribution to the planning objectives; and selection of a specific plan is based on technical, economic, and environmental criteria which permit the fair and objective appraisal of the impacts and feasibility of alternative solutions.

Technical criteria require that the optimum plan have the dimensions necessary to accommodate the expected user vessels and sufficient area to provide for maneuvering of boats and development or continued use of shore facilities. All plans must contribute to navigation efficiency and be complete within themselves.

Economic criteria require that the tangible benefits of the navigation improvement exceed the economic costs and that the scope of the project is such as to provide maximum net benefits.

Environmental criteria require that the selected plan incorporate measures to preserve and protect the environmental quality of the project area. This includes the identification of impacts to the natural and social resources of the area and the minimization of those impacts that adversely affect the surrounding environment. It also includes the assessment of impacts that are incurred during the construction of the proposed navigation improvements and those activities attracted to the area after plan implementation.

3.2 Management Measures

A broad range of management measures can be identified and evaluated as the basis for formulating alternative plans to solve the navigation problems in Wood Island Harbor. These management measures are categorized as either structural or non-structural.

Structural measures are identified as those that involve the construction of features that would, to varying degrees, meet the planning objectives developed for Wood Island Harbor. These alternatives would include providing a navigation channel. Nonstructural measures involve those solutions which would achieve the same objectives, but would do so without resorting to structural improvements. An example of a nonstructural measure would be the transfer of vessels to neighboring ports with sufficient excess capacity to accommodate the additional fishing vessels.

3.3 Analysis of Alternatives Considered

A number of navigation improvement alternatives were developed and analyzed during the early stages of the planning study. These alternatives included various dredging options and the possibility of transferring a portion of the commercial fishing fleet to neighboring ports.

The transfer of some of the fishing vessels to nearby harbors is predicated on the ability of these harbors to provide adequate protection, capacity, and efficiency of operation. Should such a port not provide adequate features and facilities, it is not likely that any commercial operators would transfer their craft. There are five commercial fishing ports within a reasonable commute of Wood Island Harbor which were analyzed as alternative ports.

Camp Ellis Harbor, 1.5 miles northwest of Wood Island Harbor in Saco, is the closest harbor to the project study area. In February 1982 the Chief of Engineers authorized the construction of a year-round protective anchorage for the commercial fleet. Construction was completed in 1983. The harbor provides adequate protection from ocean storms and river ice as well as the necessary offloading facilities. However, the new anchorage provides only enough space for the existing commercial fleet located in Saco. The old, unprotected anchorage is currently being utilized by a large recreational fleet.

Pine Point Harbor is located approximately 17 miles north in Scarborough. The harbor is overcrowded and experiencing shoaling problems in its channel and anchorages. The Corps is currently conducting a detailed project study to determine the feasibility of providing expanded anchorage. Expansion of the current fleet would only add to their overcrowding problem.

Cape Porpoise Harbor, located about 7 miles southwest in Kennebunkport also experiences severe overcrowding. The harbor does not offer the degree of protection that the Biddeford Pool fleet experiences now and is an impractical location for increased commercial operations.

Wells Harbor, located 21 miles south of Wood Island Harbor, is filled to capacity. The harbor experiences a severe shoaling problem which restricts the safe and efficient operation of vessels in that area. Breaking swells in the entrance channel make entry hazardous during moderate seas. The shoaling problem makes it difficult to access large areas of the anchorage for two hours at low tide. A 1979 reconnaissance report done by the Corps indicates the impracticality of increasing the current fleet size.

Perkins Cove is located 27 miles south of Biddeford. This harbor is also currently filled to capacity. A recently completed detailed study of Perkins Cove recommends deepening the existing entrance channel and anchorage in order to reduce grounding damages in the crowded harbor.

There are no other ports in the vicinity of Wood Island Harbor or its fishing grounds capable of efficiently handling even a small portion of the Wood Island Harbor-Biddeford Pool commercial fleet. With a lack of justification to transfer boats to other ports, it became apparent that improving navigation conditions for the commercial fleet would require actions that provide for the safe and efficient operation of these vessels at Wood Island Harbor itself.

Analysis of alternative ports led to the conclusion that the most feasible solution to the present navigation problems in Wood Island Harbor would be to provide a channel through the harbor and eliminate the shoal area that is causing the problems. Selected for consideration were three alternative depths that would provide access to Biddeford Pool. The depths are 8,10 and 12 feet below mlw and these have been designated Plans A, B and C respectively (see Figure 4).

4.0 COMPARISON OF DETAILED PLANS

There are three plans of improvement. Each differs in benefits, costs, and the amount of material dredged and involves different depths of dredging within the proposed limits of the 100-foot wide by 4200-foot long channel. Dredging would take place in only a portion of the proposed channel limits. A channel width of 100 feet was used as this width allows for safe two-way traffic in and out of the gut through Wood Island Harbor. Plan A provides an 8-foot project depth, Plan B a 10-foot depth, and Plan C a 12-foot depth.

The effects upon the marine environment from each plan, at the dredging site, are similar and vary only in the amount of material to be removed, as shown in Table 1. Subsurface analysis indicates there would be no removal of rock needed in the plans considered. For Plans A through C, dredged material would be placed on the outer face of the inter-island sand bar that connects Basket Island to Stage Island.

4.1 Project Costs

Dredging for each plan would be accomplished through the use of a hydraulic suction dredge. Material would be dredged from the channel and pumped directly to the nearby disposal site. The disposal area is about a half mile away from the construction site. As the material is deposited, it would be spread evenly over the disposal area by pipe relocation techniques and natural wave and current action. Cost and annual charges, which are directly related to the volume of material to be removed, increase as the dredging depth increases.

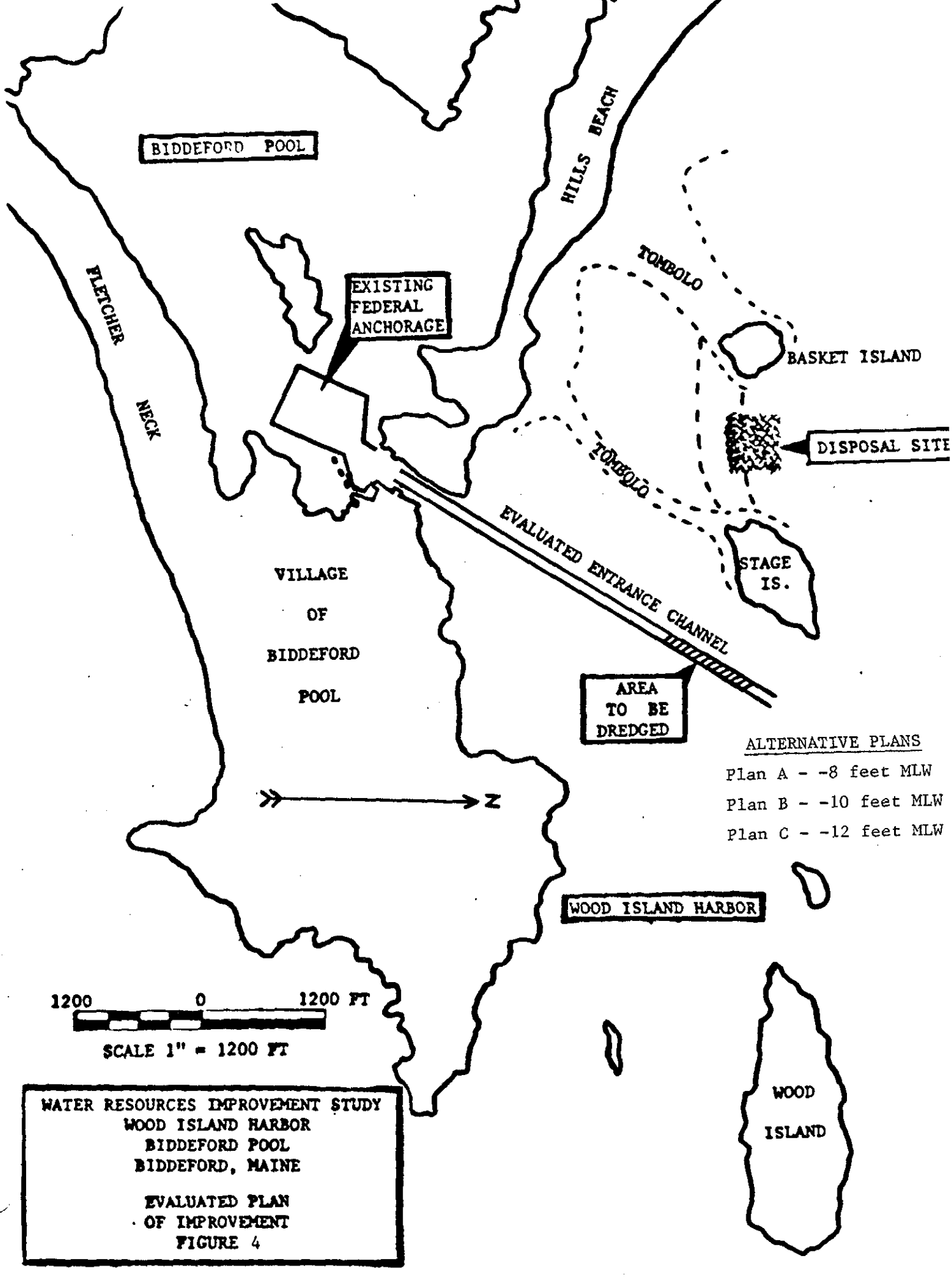
Table 2 compares the construction and maintenance costs associated with each of the three alternative plans. Navigation aids, in the form of two buoys marking the channel entrance, are included in all three plans. The navigation aids are a Federal expense to be paid by the United States Coast Guard. Maintenance of the navigation aids is included in the annual charges. A more detailed cost breakdown is provided in Appendix 2. Annual amortization charges were computed at a rate of 8 7/8 percent over a 50-year project life.

The proposed navigation channel is estimated to require maintenance at least once during the lifetime of the project. Based on survey records of the last 40 years it is estimated that the channel would shoal in at a rate of approximately 180 cubic yards per year. This annual shoaling rate has been incorporated into the annual cost of the alternatives.

4.2 Project Benefits

The three plans provide varying degrees of commercial benefits to commercial interests as shown in the breakdown of annual project benefits provided in Table 3.

Commercial benefits for the three plans (A, B and C) were measured as the difference between operating costs with and without a project. The reduction in delays benefit is determined by calculating the amount of



WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR
BIDDEFORD POOL
BIDDEFORD, MAINE

EVALUATED PLAN
OF IMPROVEMENT
FIGURE 4

TABLE 1
WOOD ISLAND HARBOR, MAINE

Description of Detailed Plans

FEDERAL PLAN DESCRIPTION	PLAN A	PLAN B	PLAN C
Channel - Depth (ft below MLW)	8	10	12
- Length (ft)	4,200	4,200	4,200
- Width (ft)	100	100	100
Dredge Quantity (cy)			
- Rock	0	0	0
- Ordinary Material	5,250	16,000	33,400
Total Dredging Quantity (cy)	5,250	16,000	33,400
Construction Duration (weeks)	3	3	4

TABLE 2
WOOD ISLAND HARBOR, MAINE

Costs of Detailed Plans

PROJECT COSTS	PLAN A	PLAN B	PLAN C
*Dredging	$117,000	$144,000	$177,000
Contingencies (20%)	23,000	29,000	35,000
Engineering and Design	22,000	22,000	23,000
Supervision and Administration	36,000	39,000	41,000
TOTAL FIRST COST	$198,000	$234,000	$276,000
Construction Period (months)	1	1	1
Interest During Construction	0	0	0
Navigation Aids	8,000	8,000	8,000
TOTAL INVESTMENT	$206,000	$242,000	$284,000
ANNUAL CHARGES			
Interest and Amortization (8 7/8% for 50 years)	$ 18,500	$ 21,800	$ 25,600
Maintenance Dredging	6,600	6,600	6,600
Maintenance of Navigation Aids	1,000	1,000	1,000
TOTAL ANNUAL CHARGES	$ 26,100	$ 29,400	$ 33,200

* Includes Mobilization and Demobilization. See Appendix 2 for more Detailed Cost Estimate.

TABLE 3
WOOD ISLAND HARBOR, MAINE

Annual Benefits of Detailed Plans

COMMERCIAL BENEFITS	PLAN A	PLAN B	PLAN C
Fishing Fleet			
- Reduction in Delays	$31,500	$37,700	$37,700
- Grounding Damages Prevented	9,500	11,200	11,200
TOTAL ALL BENEFITS	$41,000	$48,900	$48,900

reduced fuel and labor costs incurred by the commercial fishermen with each plan. Benefits were also derived from a reduction in damages to vessels due to groundings on the shoal area.

There are no recreational benefits involved with these plans to improve Wood Island Harbor. All recreational benefits would be due to anchorage improvements to the Biddeford Pool, which were dropped from the scope of the study. At the present time, the recreational fleet does not experience problems in the natural channel due to the shallower drafts of these vessels.

4.3 Comparison Summary

A summary of project benefits compared to project costs for the alternative plans is shown in Table 4. A comparison curve of net benefits for each plan is shown in Figure 5. A detailed discussion is provided in Appendix 3.

TABLE 4
WOOD ISLAND HARBOR, MAINE

Economic Impacts

	PLAN A	PLAN B	PLAN C
Annual Benefits	$41,000	$48,900	$48,900
Annual Costs	$26,100	$29,400	$33,200
Net Benefits	$14,900	$19,500	$15,700
Benefits to Costs Ratio	1.6	1.7	1.5

5.0 ASSESSMENT AND EVALUATION OF DETAILED PLANS

This section analyzes the three improvement alternatives selected for detailed study. Evaluation of the alternatives was based on their impacts on the environment, existing navigation, and social and cultural resources of the study area. The economic costs and benefits of project implementation have also been analyzed. Table 1 provides a comparison of the different features of the three basic alternatives.

5.1 Dredging Impacts

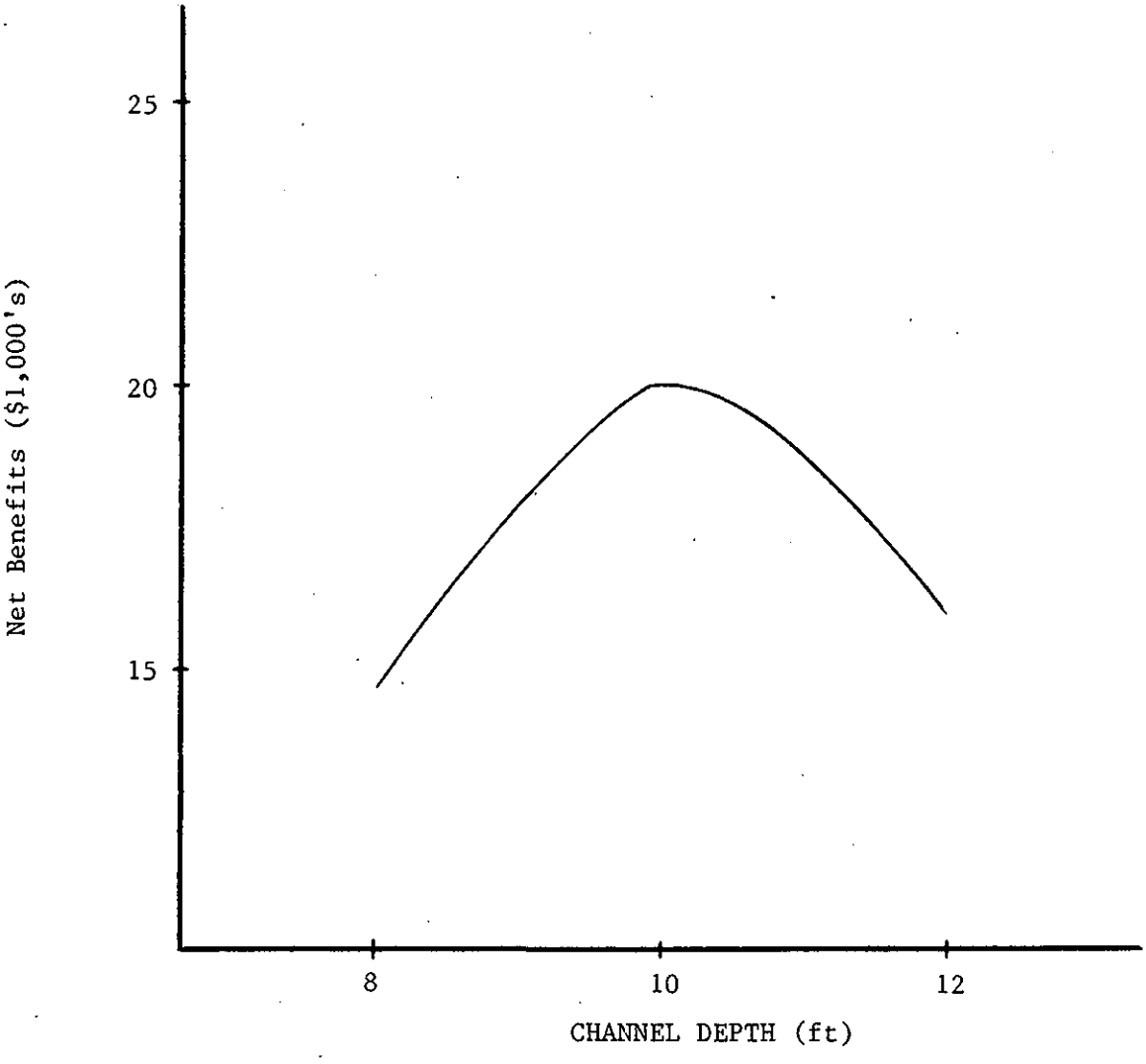
Dredging operations would result in the removal of some subtidal benthic habitat and cause temporary increases in turbidity. The loss of some non-motile benthic organisms from the project area during dredging is unavoidable, however, the area would likely be recolonized by similar species within a matter of months. Motile species such as lobsters, crabs and finfish should be able to avoid the area during dredging operations and are likely to return after the dredging is finished. Restricting construction to October through April would minimize impacts to shellfish spawning. Dredging operations would remove some eelgrass. Those species dependent on the eelgrass for foraging or shelter would be temporarily displaced. Eelgrass recolonization of the dredging site from adjacent eelgrass meadows should occur.

Dredging the proposed channel would be accomplished by use of a hydraulic dredge. This method of dredging pumps the material from the bottom in a slurry composed of 80% water and 20% sediment. Hydraulic dredging produces a minimal amount of turbidity in the water adjacent to the construction site. Sediments in the proposed dredging area are sandy in nature (less than 4 percent fines) and therefore any suspended material in the water would settle out rapidly. Additional information on the impacts of construction at the dredging site is contained in the Environmental Assessment in Appendix 1.

5.2 Disposal Impacts

Disposal of the dredged material would consist of pumping the sand approximately 1/2 mile onto the seaward face of the inter-island sand bar between Stage Island and Basket Island. Disposal of the material would cause localized turbidity during its release from the pipeline at the disposal area. The dredged material would be deposited taking advantage of the outgoing tide, slack tide and incoming tide to the height of the sand bar, in order to restrict movement of the sand toward the tidal flat areas of Hills Beach. The sand bar would in fact act as a barrier against the landward movement of the material. Again, due to the sandy nature of the material, any suspended material should settle out rapidly and the level of turbidity return to background levels with completion of the project.

Once deposited, the material would be subject to the same tidal forces currently experienced in the area. The dredged material would be worked by the tides and spread out evenly over the disposal area. The sand bar would



Wood Island Harbor
Biddeford, Maine

Figure 5

Net Benefit Curve

not be impacted so as to interfere with the tidal flows over the areas behind the bar. More information on the impacts of the disposal site is contained in the Environmental Assessment in Appendix 1.

5.3 Economic Impacts

Economic impacts of the alternative plans were evaluated by determining costs and benefits. The cost estimates, listed in Table 2 and described fully in Appendix 2, are based on several factors including: the quantity and type of dredged material, mobilization and demobilization costs, equipment costs, project design (engineering and supervision) and administrative costs and contingencies. Charges for interest during construction (IDC) are based on varying construction durations and are computed for the purpose of comparing benefits to costs. IDC charges are not included in the cost apportionment.

For the purpose of determining the benefit to cost ratio, costs have been calculated as an annual cost over a 50-year amortization period using an interest rate of 8 7/8 percent.

The benefits of the proposed plans of improvement, as described in detail in Appendix 3, have been based on the following assumptions:

- Elimination of tidal delays would result in decreased labor and fuel costs.
- Providing a channel through Wood Island Harbor would reduce grounding damages experienced by the existing commercial fleet.
- The benefits to the existing commercial fleet would occur immediately following the implementation of these improvements.

6.0 SELECTION OF A PLAN

6.1 The Selected Plan

The selected plan for navigation improvements at Wood Island Harbor, Maine, has been based on consideration of economic efficiency, minimization of environmental impacts, navigational safety and the needs of state government and local parties. Based on these criteria, Plan B results in the greatest net benefits, and is therefore the NED plan. This plan provides the most favorable improvement method for meeting the project objective of reducing navigation hazards and delays. The plan also complements the Fishermen Association's improvement work at Biddeford Pool. As shown in Figure 6, the recommended plan would consist of providing a navigation channel through Wood Island Harbor that is 4,200 feet long, 100 feet wide and 10 feet deep at MLW.

The selected plan would require the removal of 16,000 cubic yards of material. The material would be dredged by a hydraulic dredge and pumped through a pipeline, approximately 1/2 mile, to an inter-island sand bar between Basket and Stage islands.

The first cost of construction for the selected plan is estimated to be $234,000. Navigation aids costing $ 8,000 will bring the total cost to $242,000. Annual benefits total $ 48,900 for commercial interests. These benefits, when compared to a 50-year ammortized annual cost of $29,400, yield a benefit-cost ratio of 1.7.

The selected plan is estimated to require maintenance at least once during the project lifetime. Based on survey records over the last 40 years, the channel is anticipated to shoal in at a rate of approximately 180 cubic yards per year. This shoaling rate has been used in determining annual costs.

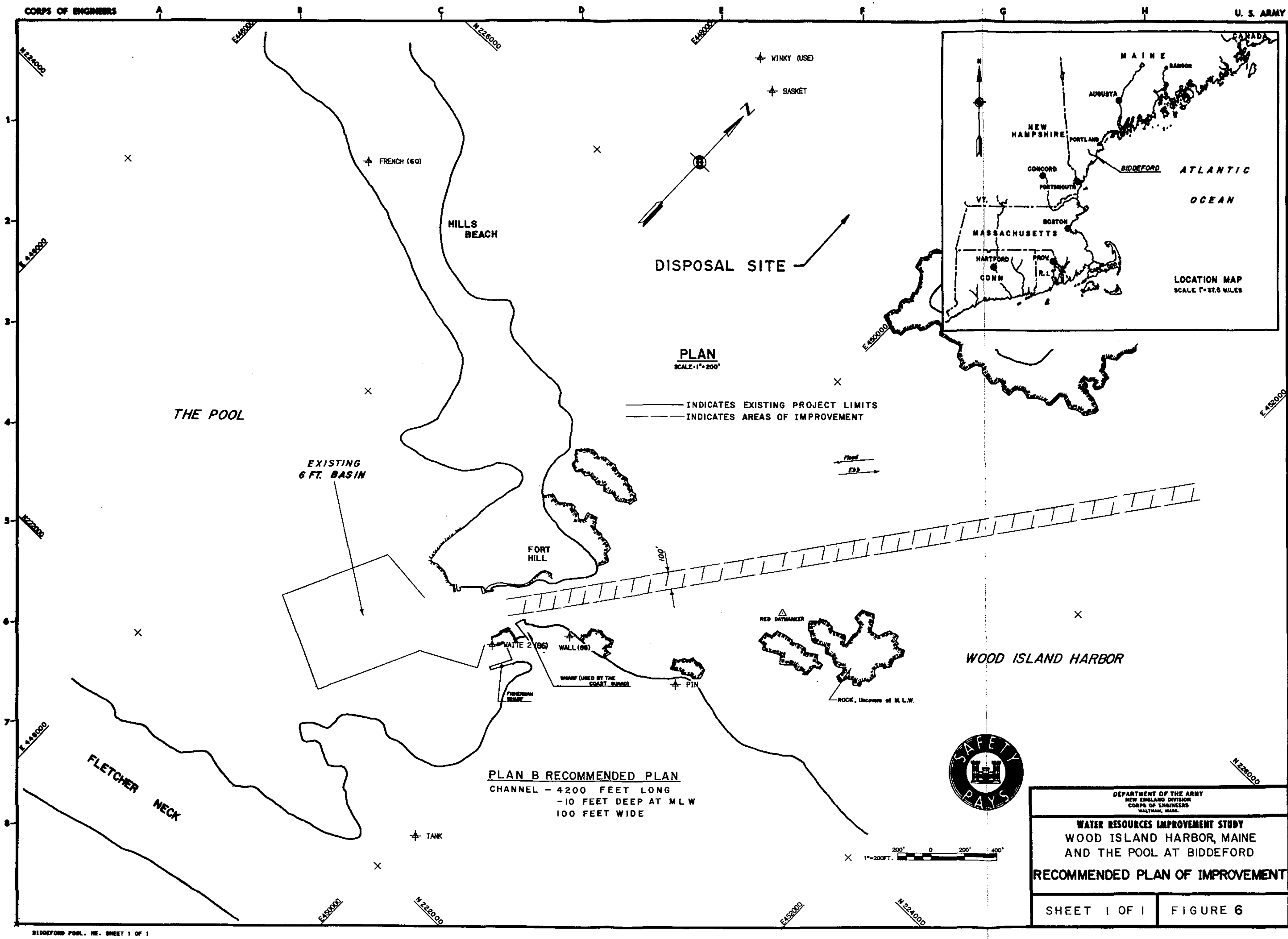
6.2 Implementation Responsibilities

6.2.1 Cost Apportionment

The Federal and non-Federal sharing responsibilities for the first cost of construction, as stipulated in the Water Resources Development Act of 1986 (Public Law 99-662), requires that the local sponsor contribute at least 20% ($47,000) of the first cost of construction. At least 10% ($23,500) of the first cost is to be paid during the construction period, and the other 10% ($23,500) may be paid over a period of up to 30 years. The remaining share (80%) of the first cost, $187,000, is the Federal contribution.

6.2.2 Federal Responsibilities

The Federal responsibilities include preparation of plans and specifications and contract advertisement, award and supervision. Federal responsibility also includes only its share of construction and 100 percent of future maintenance of the designated Federal channel.


CORPS OF ENGINEERS
U. S. ARMY
WINKY (USE)
BASKET
FRENCH (60)
HILLS BEACH
DISPOSAL SITE
PLAN
SCALE: 1" = 200'
INDICATES EXISTING PROJECT LIMITS
INDICATES AREAS OF IMPROVEMENT
THE POOL
EXISTING 6 FT. BASIN
Flood
Ebb
FORT HILL
100'
RED DAYMARKER
WAITE 2 (86)
WALL (86)
WHARF (USED BY THE COAST GUARD)
FISHERMAN WHARF
PIN
ROCK, Uncovers at M. L.W.
WOOD ISLAND HARBOR
FLETCHER NECK
TANK
PLAN B RECOMMENDED PLAN
CHANNEL - 4200 FEET LONG
-10 FEET DEEP AT MLW
100 FEET WIDE
1"=200FT.
200' 0 200' 400'
MAINE
BANGOR
AUGUSTA
NEW HAMPSHIRE
PORTLAND
BIDDEFORD
CONCORD
PORTSMOUTH
ATLANTIC OCEAN
VT.
BOSTON
MASSACHUSETTS
HARTFORD
PROV.
R.I.
CONN
CANADA
LOCATION MAP
SCALE 1"=37.5 MILES
SAFETY PAYS
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR, MAINE
AND THE POOL AT BIDDEFORD
RECOMMENDED PLAN OF IMPROVEMENT
SHEET 1 OF 1
FIGURE 6
BIDDEFORD POOL. ME. SHEET 1 OF 1

The total Federal expenditures for construction and operation and maintenance under the Section 107 authority are administratively limited to the greater of $4,500,000 or 2.25 times the Federal costs of the project, including costs for the reconnaissance through the construction phases. These expenditures are computed on a present worth basis starting with the date the sponsor accepts the project.

6.2.3 Non-Federal Responsibilities

The following is a list of items of local cooperation required for projects authorized under Section 107. The local sponsor must provide assurance of intent to meet these items prior to project authorization. A draft Local Cooperation Agreement (LCA) is included in the report.

1. Assume full responsibility for all non-Federal costs associated with the project. Current law requires that the non-Federal sponsor provide at least 20% of the first cost of construction of General Navigation facilities not exceeding 20 feet in depth.

2. Provide, maintain and operate without cost to the United States, an adequate public landing open and available to use for all on an equal basis.

3. Provide without cost to the United States, all necessary lands, easements and rights of way necessary for project construction and subsequent maintenance, and acceptable disposal areas.

4. Hold and save the United States free from damages that may result from construction and maintenance of the project.

5. Provide and maintain mooring facilities as needed for transient and local vessels as well as necessary access roads, parking areas and other needed public use shore facilities open and available to all on an equal basis. Only minimum basic facilities and services are required as part of the project. The actual scope or extent of facilities and services provided over and above the required minimum is a matter of local decision. The manner of financing such facilities and services is a local responsibility.

6. Assume full responsibility for all project costs in excess of the Federal cost limitation of $4,000,000. The Federal cost limitation includes prior construction costs and all investigations, planning, engineering, supervision, inspection, and administration involved in the development and construction of the project. The total Federal expenditures for this project are $498,000.

7. Federal navigation projects must be managed in the general public interest and must be accessible and available to all on equal terms. Any number of approaches may be used to assure that all citizens desiring mooring or other access to the projects are treated impartially; it is not the Federal Government's intention to prescribe specific procedures. A management system shall be considered acceptable provided that it:

- Makes no arbitrary distinction or requirement of any kind in allocating use of the project and ancillary facilities and services to the public except as may be consistent with the purpose for which the project was constructed.

- Does not impose arbitrary fees or arbitrary variations in fees among users. The cost of providing necessary management and ancillary facilities and services may be offset through equitable user fees based on the actual costs incurred.

- Provides information pertinent to harbor management - including but not limited to rules and regulations, lists of mooring holders, waiting lists and fee schedules - that is readily available to the public at all times.

6.3 Conclusions

The New England Division, Corps of Engineers, has reviewed and evaluated all pertinent data concerning the proposed plan for improving navigation at Wood Island Harbor. The Corps has also reviewed and evaluated the stated views of interested agencies and concerned public regarding the alternative plans. The possible consequences of each alternative have been evaluated on the basis of engineering feasibility, environmental impact and economic efficiency.

We find substantial benefits are to be derived by providing the commercial fishermen with reliable and safe access through Wood Island Harbor. Although the proposed improvement would cause a minor disruption of the environment during dredging operations, it is not considered significant. On that basis an environmental assessment has been prepared. Due to the significant benefits attributable to the commercial fishing fleet, any effects are considered to be offset by the improvement.

The recommended plan, Plan B, would result in the greatest economic net benefits and is therefore the NED Plan. This Plan would provide a channel through Wood Island Harbor that is 4,200 feet long, 100 feet wide, and 10 feet deep at MLW. The channel would begin in the Gut at Biddeford Pool and extend to the deep water reaches of Wood Island Harbor. Disposal of the dredged material would be on the outer face of the inter-island sand bar located between Stage and Basket Islands.

The total non-Federal cost share required for construction is presently estimated at $ 47,000. It is reasonable to expect that funds will be available to satisfy the non-Federal sponsor's financial obligation.

7.0 RECOMMENDATIONS

I recommend that the existing Federal navigation project at Wood Island Harbor, Biddeford, Maine, under the authority of Section 107 of the River and Harbor Act of 1960, as amended, be modified in accordance with the Plan selected herein, Plan B, with such further modifications thereto as in the discretion of the Chief of Engineers may be advisable. I also recommend that the Division Engineer be delegated authority to approve Plans and Specifications.

I have considered all significant aspects in the overall public interest including environmental, economic, and social effects, and engineering and financial feasibility in concluding that the NED plan of improvement described herein is the best implementable alternative achieving the objectives of this investigation subject to financial commitment.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are authorized for implementation funding.

Daniel M. Wilson
Colonel, Corps of Engineers
Division Engineer

ACKNOWLEDGEMENT AND IDENTIFICATION OF PERSONNEL

This report was prepared under the supervision and management of the following New England Division personnel:

Colonel Daniel M. Wilson, Division Engineer
Joseph L. Ignazio, Chief, Planning Division
Nicholas E. Avtges, Chief, Plan Formulation Branch
John T. Smith, Chief, Coastal Development Section

The study report was developed and prepared by Christopher L. Hatfield, Project Manager. The environmental assessment was prepared by Catherine Demos. The cost estimates were prepared by Robert Simeone, Engineering Division. The economic assessment was prepared by Marianne Matheny and Karen Fredrickson.

The New England Division is appreciative of the cooperation and assistance rendered in connection with this study by personnel of other Federal offices and agencies, state and municipal authorities, and the Biddeford Pool Fishermens Association and Biddeford Pool Yacht Club.

Environmental Assessment
Section 404(b)(1) Evaluation
Finding of No Significant Impact

For the Proposed Navigation
Improvement Dredging of
Wood Island Harbor
Biddeford, Maine

Catherine J. Demos
Ecologist

October 1988

New England Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Table of Contents

I. Environmental Assessment

A. Introduction

1. Purpose

A small navigation improvement project is proposed for Wood Island Harbor, Maine. A sandy shoal area between Stage Island and Wood Island has created hazardous conditions and costly repairs for commercial fishermen attempting to leave or enter the anchorage basin in Biddeford Pool. The currently proposed plan provides for the establishment of a commercial navigation channel to alleviate these problems. The improvement dredging would create an entrance channel from the gut in Biddeford Pool to deep water in Wood Island Harbor.

Wood Island Harbor borders the southern coastal city of Biddeford, Maine. The harbor is located about 7 miles southeast of the center of Biddeford and 15 miles south of the city of Portland. Saco River borders the harbor to the north and Fletcher Neck extends into the harbor to the south (Figure 1).

2. Need

The commercial fishing fleet consists of 23 year-around vessels varying in size from 18 feet to 54 feet. All of the vessels are lobster boats except for three dragger/trawlers. The lobster boats make between 225 and 250 trips during the 42 ice free weeks per year. Five lobster boats also contain gillnetting equipment. The proposed improvements to the channel would decrease navigational risks and delays caused by shoaling. The proposed improvement channel has decreased in depth by more than two feet in the last 40 years. Several vessels have grounded in recent years causing damage to vessels and gear. Operating costs, such as fuel expenses, would be reduced as fishermen are no longer required to wait for incoming tides as they transit the harbor.

3. Authority

The authority for this study is contained in the provisions of Section 107 of the 1960 River and Harbor Act, as amended. In a letter dated 23 April 1981, the city of Biddeford requested that the Corps of Engineers study the feasibility of Federal participation in improving Wood Island Harbor under existing continuing authorities for small navigation improvement projects.

4. Prior Federal Improvements in the Project Area

A 1949 survey report recommended that three navigation improvements be constructed within the Biddeford Pool. These included a 10.2-acre, 6-foot deep MLW anchorage located about 800 feet inside of the entrance to Biddeford Pool, an adjoining 2-acre mooring basin at the

wharves on the southside of the gut and an array of three rubblemound icebreakers to protect the mooring basin. The improvements recommended in the 1949 survey report were authorized on 17 May 1950 and completed in 1956.

B. Proposed Project Description

1. Dredging

The proposed project would provide for the establishment of a commercial navigation channel from the gut at Biddeford Pool to deepwater in Wood Island Harbor (Figure 2). This would involve the removal of a sandy shoal area between Stage and Wood Islands. The dimensions of the proposed channel are 100 feet wide, 10 feet deep and approximately 4200 feet long. Dredging the channel would remove approximately 16,000 cubic yards of sandy material using a hydraulic pipeline dredge. The dredge would hydraulically lift material off the channel bottom in a slurry consisting of 20% solid and 80% water and pump it to the disposal site through a pipe.

A 1987 hydrographic survey indicated that one half to three feet of substrate will need to be removed to obtain the desired depth. Dredging will occur between October 1 through the end of March and take approximately three weeks to complete.

2. Disposal

Approximately 16,000 cubic yards of sandy dredged material will be pumped through a hydraulic pipeline to an inter-island sand bar located between Stage Island and Basket Island (Figure 2). The material will be placed on the seaward side of the sand bar to below mean low water. The hydraulic pipeline will extend across the Stage Island tombolo to the disposal site on the outer face of the inter-island sand bar. The hydraulic pipeline would start near the center of the tombolo and increase in length as the operation progresses. In this way the dredged material will be evenly distributed across the proposed disposal site with most of the material deposited near Basket Island. Disposal will only occur during outgoing tides, slack tide, and incoming tides up to the height of the sand bar to minimize environmental impacts. This site had been approved by the State of Maine's Planning Office (see Appendix C).

C. Alternatives

1. No Action

Without Federal action it is unlikely that any navigation improvements will be made at Wood Island Harbor. Fishermen who invest in larger craft find it difficult to operate out of Biddeford Pool. Without improvements, the efficiency of the fleet will continue to be impaired by

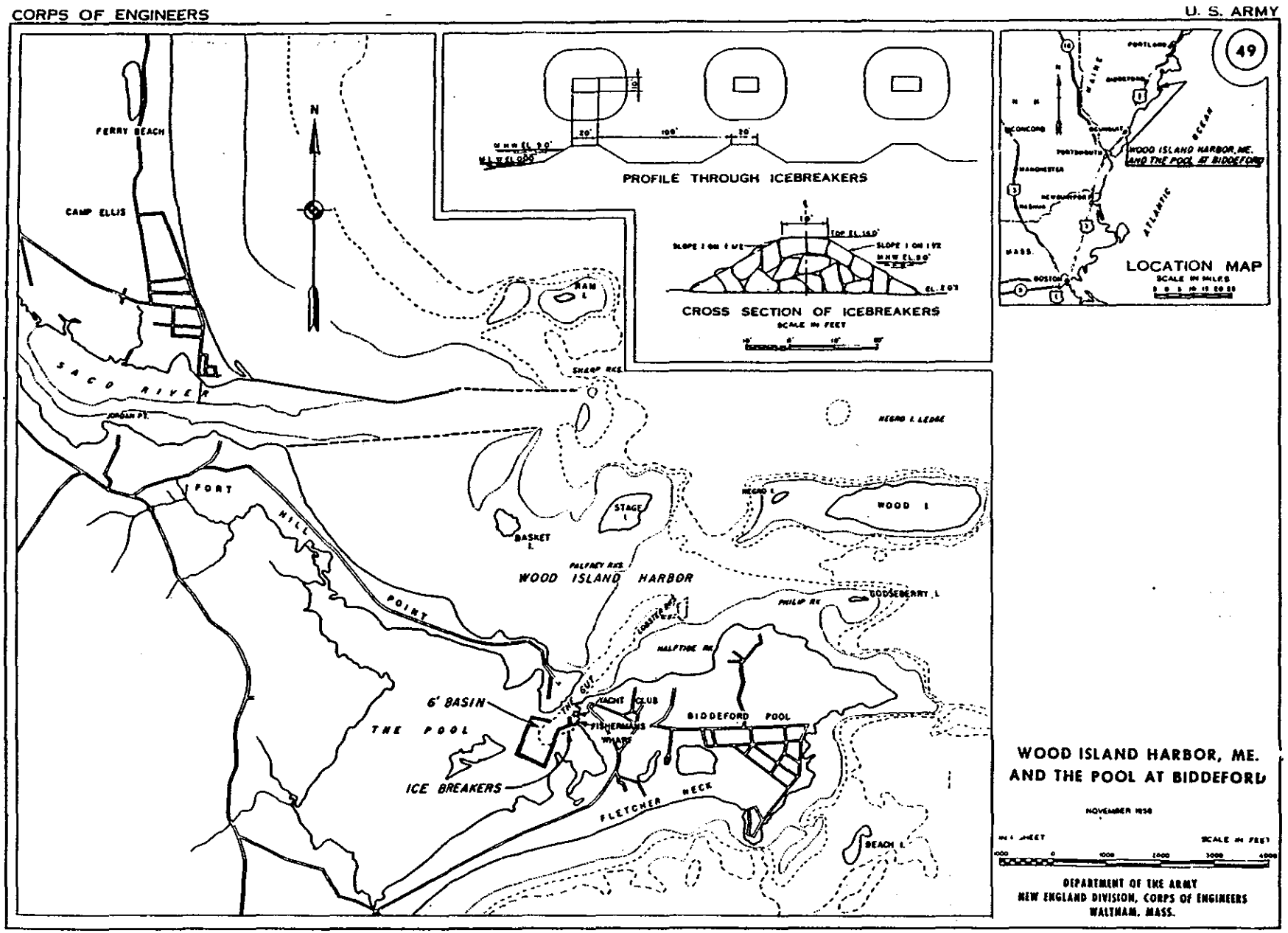
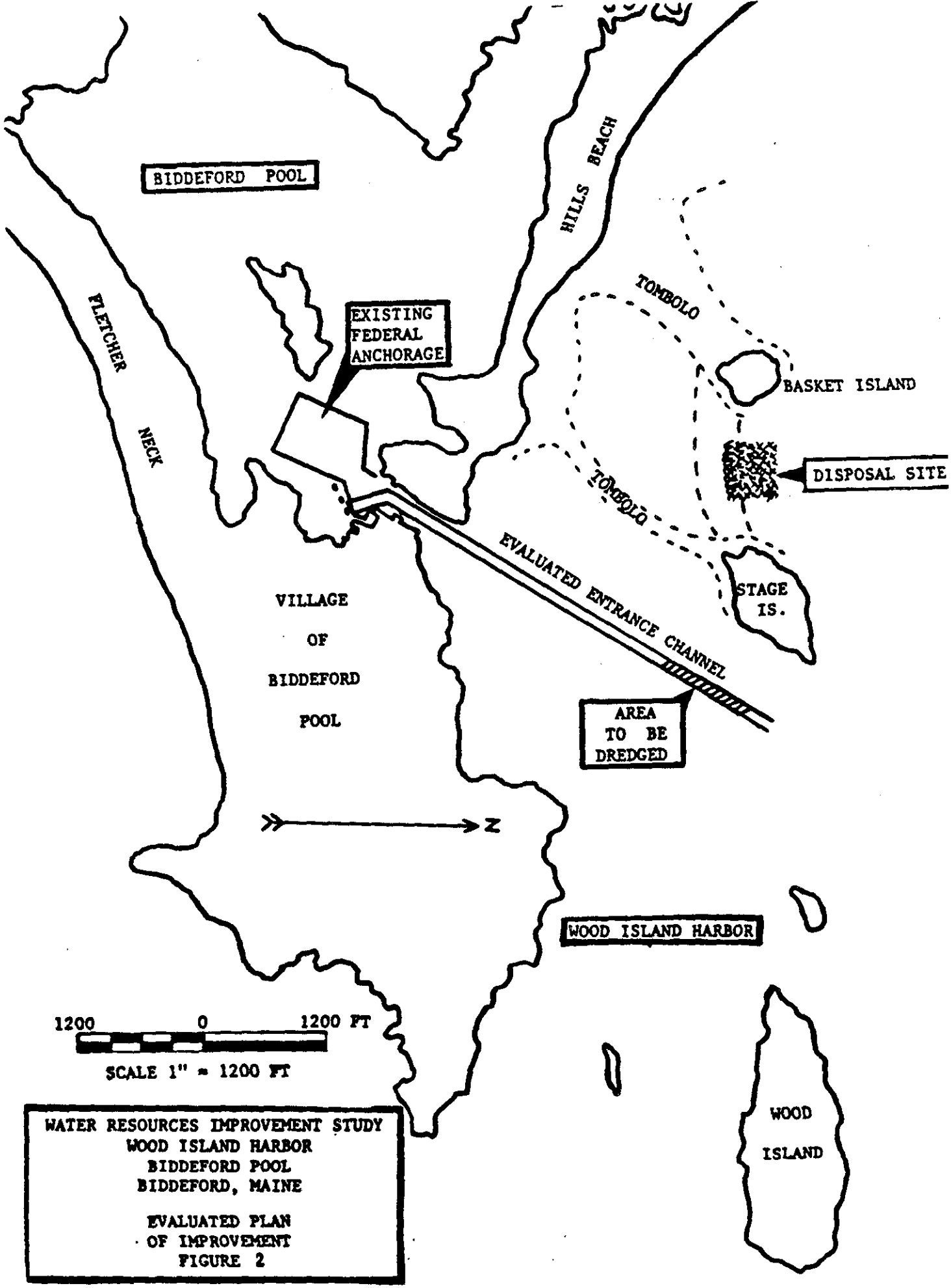

CORPS OF ENGINEERS
U. S. ARMY
PROFILE THROUGH ICEBREAKERS
CROSS SECTION OF ICEBREAKERS
SCALE IN FEET
LOCATION MAP
WOOD ISLAND HARBOR, ME. AND THE POOL AT BIDDEFORD
FERRY BEACH
CAMP ELLIS
SACO RIVER
FORT
HILL
POINT
WOOD ISLAND HARBOR
WOOD I.
STAGE I.
BASKET I.
GOOSEBERRY I.
6' BASIN
THE POOL
ICE BREAKERS
YACHT CLUB
FISHERMANS WHARF
BIDDEFORD POOL
FLETCHER NECK
BEACH I.
WOOD ISLAND HARBOR, ME. AND THE POOL AT BIDDEFORD
NOVEMBER 1950
SCALE IN FEET
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

FIGURE 1



WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR
BIDDEFORD POOL
BIDDEFORD, MAINE

EVALUATED PLAN
OF IMPROVEMENT
FIGURE 2

increasing tidal delays due to shoaling in the channel. Groundings will become more frequent as shoaling increases. Fishermen who have invested in modern deeper draft vessels may be forced to move their commercial operations, residences and families to another more efficient port in order to retain an acceptable rate of return on their vessel investment. Other fishermen may find it more acceptable to leave the industry and seek alternative means of employment.

2. Modifications of the Proposed Dredging

Dredging the proposed channel will be accomplished by use of a hydraulic pipeline dredge. The hydraulic pump is used to remove and transport the dredge material through a pipeline to a preferred disposal site. Minimal levels of turbidity are created at the dredge site as the material is removed in a slurry.

Other methods used to dredge material include the mechanical dredge and the hydraulic sidecaster. The mechanical dredge uses a bucket to remove the substrate in a cohesive mass. The dredge material is placed and transported in a scow for ocean or upland disposal. This method was considered but the higher cost of ocean disposal and the lack of a suitable upland disposal site discouraged the use of this dredge method.

Hydraulically sidecasting dredge material from the side of the vessel could risk introducing the material back into the proposed channel. This could cause shoaling to occur at a faster rate in the proposed channel increasing the number of times maintenance dredging is required.

3. Modification of Proposed Disposal

Potential disposal sites for the dredged material include upland disposal, nearshore or ocean disposal and, if the dredged material is suitable, beach nourishment. Upland disposal sites require the availability of an adjacent land site to dewater the dredged material before trucking it to a suitable upland disposal site. No adjacent waterfront facilities are available for dewatering in the project area. The lack of suitable upland sites and dewatering sites preclude upland disposal as a viable alternative.

Nearby Hills Beach had been previously selected as a beach site suitable for the disposal of dredged material. However, the environmental impacts associated with beach nourishment on the intertidal benthos and soft-shelled clam habitat were considered unacceptable. Standard operating procedures, based on cost considerations, limit the area of disposal from a hydraulic dredge to one mile. This would eliminate nearby beaches (i.e. Ferry Beach) which are outside the one mile radius as a beach nourishment site.

Disposal of the dredged material at an ocean disposal site, such as the Cape Arundal Disposal Site or the Saco Bay Disposal Site, would limit the use of the clean sandy material in a beneficial manner by taking it out of the littoral system. Ocean disposal is also more costly than a hydraulic pipeline dredge.

Nearshore disposal sites were investigated at low tide by staff from the Corps of Engineers and the Maine Geological Survey on April 25, 1988 to locate potential disposal areas. The field survey focused on intertidal areas off of Hills Beach in Biddeford. The purpose of the survey was to locate an adequate disposal site within one mile from the dredge site which would not involve significant impacts to shellfish and other biological resources. Various shellfish and worm populations were observed inhabiting other intertidal areas. The proposed disposal site, an inter-island sand bar between Stage Island and Basket Island, was selected because of its compatible grain size with the dredged material (Appendix A) and lack of significant intertidal fauna (see Affected Environment Section).

D. Affected Environment

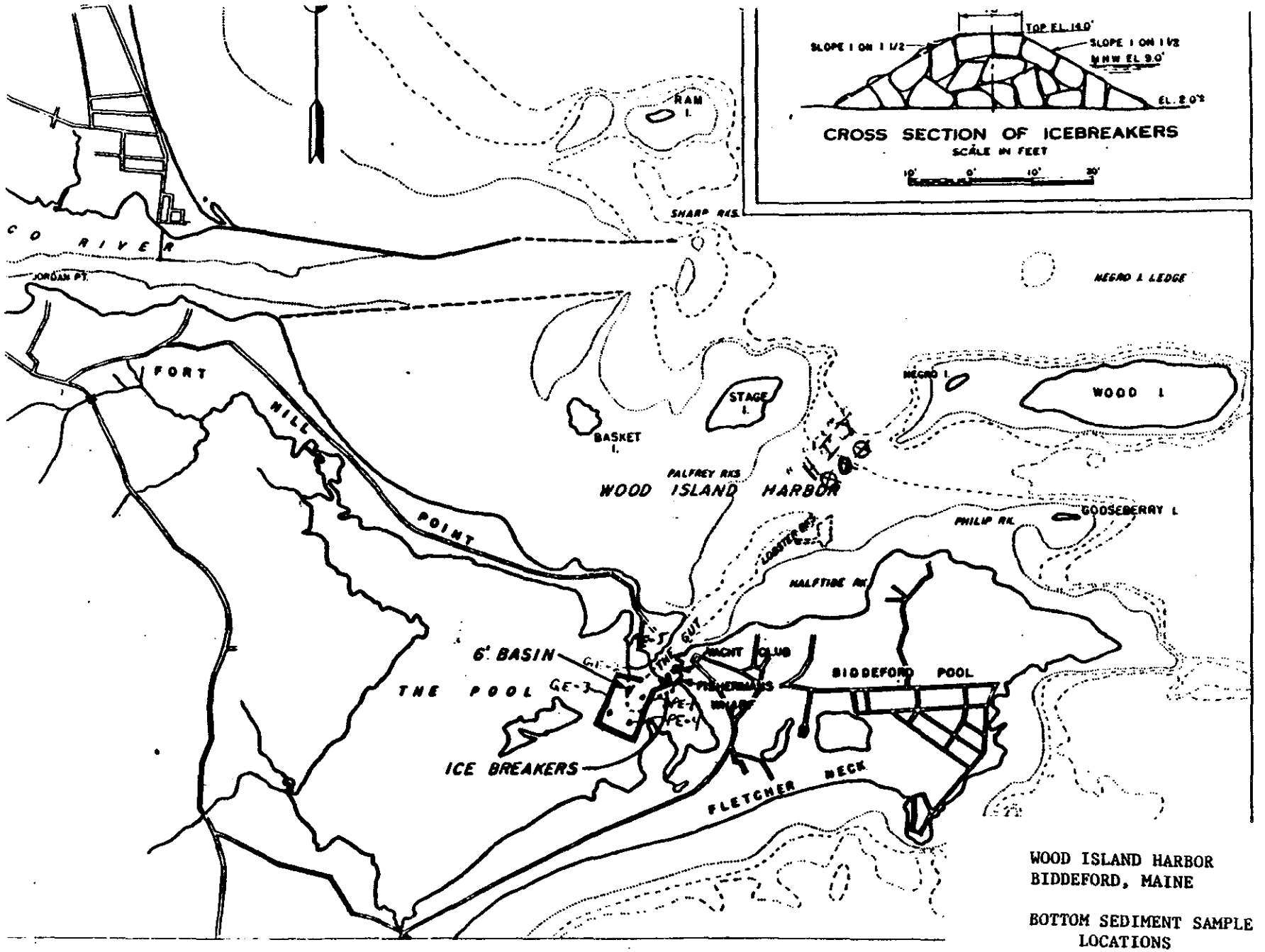
1. Dredging Site

a. Physical and Chemical

Three surface sediment samples were taken at the proposed navigation improvement channel in 1983 and analyzed for their chemical composition and grain size. Figure 3 shows the sample locations and Appendix A displays the gradation curves for the sediment samples collected. These surface samples reveal medium to fine sand and silty fine sand in the proposed navigation improvement channel. Minimal fines (2%) were found at locations "H" and "J". Location "I" exhibited a greater percentage (16%) of silty fines.

Parameters analyzed in the bulk sediment test (Table 1) are well within the State of Maine's guidelines for Class I dredged material (Table 2). Class I material is coarse-grained sediment and needs no review by technical services. This material is acceptable for upland disposal as inert fill and for construction projects after dewatering. Elutriate and bioassay tests were not deemed necessary due to the coarse nature of the substrate and low level of contaminants.

A test bore was attempted in November 1987 to determine the grain size of the material to be dredged down to the proposed channel depth. Due to the sandy nature of the material encountered, no samples were retained in two different samplers that were used. As a result only surface grab samples were obtained. The material tested consisted of poorly graded sand with an average of 98% fine sand and 2% medium grade sand (Appendix A).



WOOD ISLAND HARBOR
BIDDEFORD, MAINE

BOTTOM SEDIMENT SAMPLE LOCATIONS

FIGURE 3

Table 1
Bulk Sediment Analysis
Proposed Navigation Improvement Channel
Wood Island Harbor, Biddeford, ME

Parameter	Location H	Location I	Location J
% Fines	2	16	2
% Volatile Solids - EPA	0.86	1.43	--
% Volatile Solids - NED	0.65	1.05	--
Oil and Grease (ppm)	50	90	90
Mercury (ppm)	0.14	<0.05	0.06
Lead (ppm)	3	4	3
Zinc (ppm)	15	19	19
Arsenic (ppm)	<1	1.2	1.6
Cadmium (ppm)	<1	<1	<1
Chromium (ppm)	7	12	12
Copper (ppm)	<2	3	2
Nickel (ppm)	<10	<10	<10
Silver (ppm)	<1	<1	<1
Vanadium (ppm)	<100	<100	<100

Table 2
Maine's Guidelines for Classification of
Dredged Material*

Constituent	Class		
	Class I	Class II	Class III
Percent Oil and Grease	<0.25	0.25 - 1.2	>1.2
Percent Volatile Solids	<4.5	4.5 - 15.3	>15.3
Percent Silt/Clay	<60	60 - 90	>90
Mercury (ppm)	<0.5	0.5 - 3.0	>3.0
Lead (ppm)	<83	83 - 285	>285
Arsenic (ppm)	<7	7 - 22	>22
Cadmium (ppm)	<3	3 - 15.5	>15.5
Chromium (ppm)	<112	112 - 513	>513
Copper (ppm)	<83	83 - 342	>342
Nickel (ppm)	<36	36 - 92	>92
PCB (ppm)	0	0-4.9	5 - 49

* Maine Department of Environmental Protection draft guidelines for upland disposal (above mean high water).

The waters of Wood Island Harbor are classified as SB under the State of Maine Water Quality Classification System. Class SB waters are suitable for the designated uses of recreational activities in and on the water, fishing, agriculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other estuarine and marine life. Mean tidal range for the project area is 8.7 feet.

Surface dissolved oxygen, and a temperature salinity profile were obtained by Corps of Engineers personnel during biological sampling in Wood Island Harbor on August 12, 1986. This data was obtained to characterize the environment of the proposed navigation channel. Table 3 lists the results of the water chemistry analysis. Air temperature was 19.5°C. Salinity at the surface was 18.9 parts per thousand (0/00) and bottom salinity was 25.5 0/00. Surface dissolved oxygen was 8.2 ppm.

b. Biological

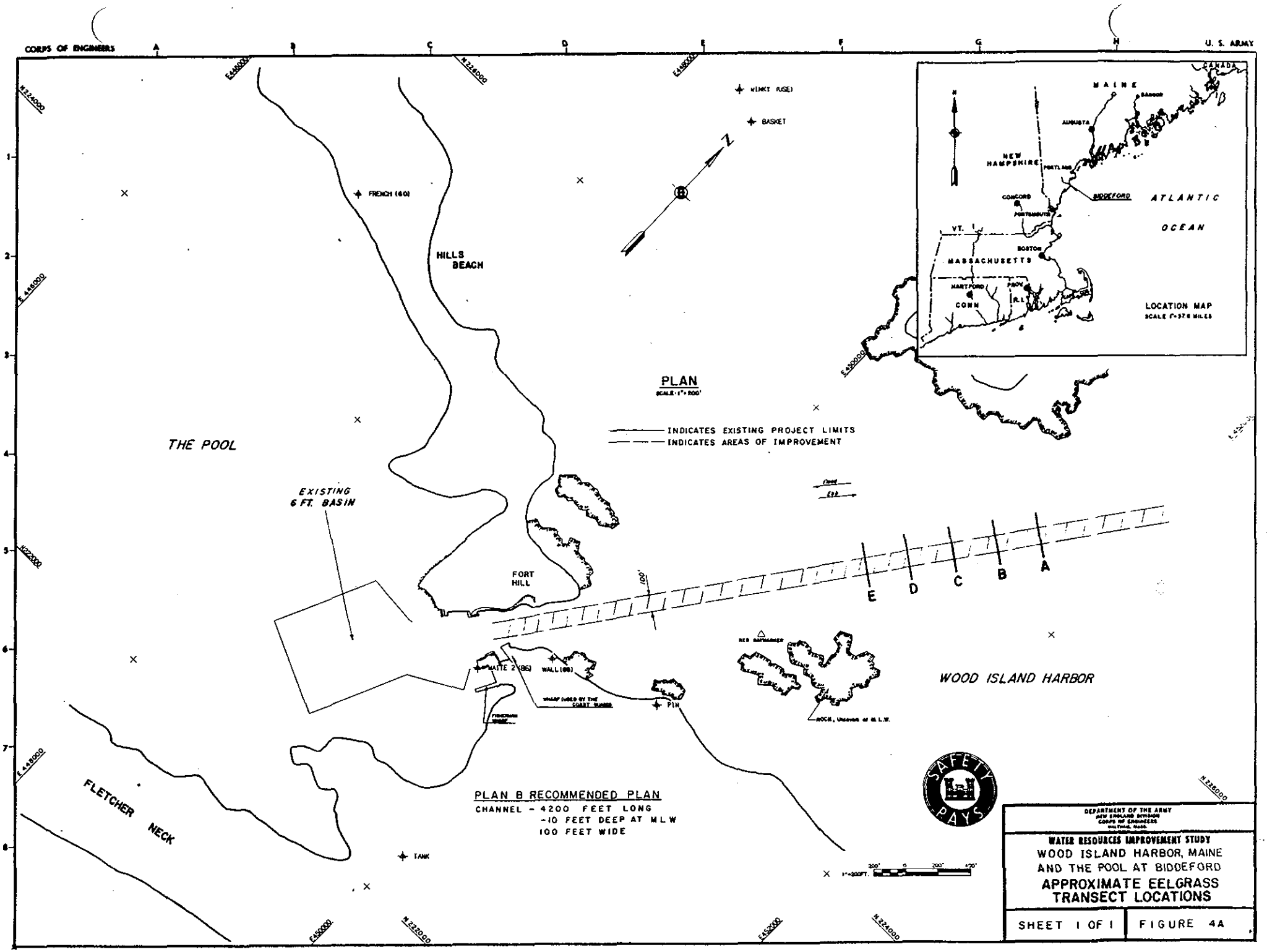
Sampling for eelgrass in the proposed navigation channel was undertaken by personnel of the Corps of Engineers on 12 August 1986. Five transects (A,B,C,D,E) were established perpendicular to the proposed channel (see Figure 4a). Three grab samples ($0.04m^2$) were taken along each transect. These samples were taken from each side and in the center of the channel for a total of 15 grab samples. Transect A was the most seaward transect and outside the proposed dredge area. It is also in the deepest water (13 feet MLW).

Only transects A and C recovered eelgrass (see Table 3a). Three to five sprigs of eelgrass were collected from all three grab samples along transect A. Three to five sprigs of eelgrass were collected from two of the three grab samples along transect C. The shoal area is approximately 1,200 feet long.

It appears from the transects sampled that eelgrass may survive better in the deeper water. Fisherman from Biddeford Pool pass through Wood Island Harbor in the area of the proposed navigation channel. Since the shoal presents navigational difficulties for fisherman, it is possible that less eelgrass is observed in shallower waters because of impacts from fishing vessels. These disruptions may also inhibit the recolonization of eelgrass, thus accounting for the scattered patches of eelgrass in the shoal area.

Five random VanVeen grab samples were also obtained from the proposed channel to determine benthic community assemblage. Each sample was sieved through a 0.5mm screen, stained with Rose Bengal and preserved in 10% buffered formalin solution. Table 4 lists the species identified and enumerated.

The phylum Annelida, class Polychaeta contained the largest number (13) of species and the highest density (1950.5) of individuals per square meter. The polychaete Spiophanes bombyx averaged 1004.3 individuals per square meter or 41.9% of all individuals inhabiting the project site. Orders Cumacea, Isopoda, Amphipoda within the phylum Arthropoda contained the


CORPS OF ENGINEERS
U. S. ARMY
WINKT (USE)
BASKET
FRENCH (60)
HILLS BEACH
THE POOL
EXISTING 6 FT. BASIN
FORT HILL
PLAN
SCALE: 1" = 200'
INDICATES EXISTING PROJECT LIMITS
INDICATES AREAS OF IMPROVEMENT
WOOD ISLAND HARBOR
FLETCHER NECK
TANK
PLAN B RECOMMENDED PLAN
CHANNEL - 4200 FEET LONG
-10 FEET DEEP AT M L W
100 FEET WIDE
CANADA
MAINE
AUGUSTA
NEW HAMPSHIRE
PORTLAND
CONCORD
PORTSMOUTH
BIDDEFORD
ATLANTIC OCEAN
VT.
BOSTON
MASSACHUSETTS
HARTFORD
PROV.
R.I.
CONN
LOCATION MAP
SCALE 1"=37.5 MILES
SAFETY PAYS
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR, MAINE
AND THE POOL AT BIDDEFORD
APPROXIMATE EELGRASS
TRANSECT LOCATIONS
SHEET 1 OF 1
FIGURE 4A

second largest number of individuals (240.7) per square meter and species (5). The remaining species identified are contained in the phylums Mollusca and Echinodermata. An average Shannon Diversity Index of 0.6874 for the harbor samples indicates a moderate diversity of individuals among species. An eveness value (H') of 0.7708 indicates relatively even distribution of individuals in the population. The substrate from all VanVeen grab samples had less than one centimeter biogenic mixing depth (oxygenated layer) and brown/gray silty fine sand.

Table 3
Water Chemistry Data

Location: Wood Island Harbor, Maine
Tide: Incoming; High Tide 16:38
Date: 8/12/86 Time: 14:15
Dissolved Oxygen: 8.2 ppm
Weather: Clear/Few Clouds/ Warm

Depth	Temperature (Celsius)	Salinity (0/00)
Air	19.5o	--
Surface	17.9o	18.9
1 meter	17.5o	19.5
2 meters	15.5o	20.5
3 meters	14.2o	25.1
4 meters	14.2o	25.1
5 meters	14.0o	25.5
6 meters	13.9o	25.5

Table 3a
Concentrations of Eelgrass collected from the Proposed Navigation Channel

	Transects				
	A	B	C	D	E
1.	3-5 sprigs	0	3-5 sprigs	0	0
2.	3-5 sprigs	0	0	0	0
3.	3-5 sprigs	0	3-5 sprigs	0	0

Table 4
Wood Island Harbor, Maine
Benthic organisms collected with a VanVeen grab ($0.04m^2$)
from the proposed navigation improvement channel on 12 August 1986.

Species	Grab 1	2	3	4	5
	number of species/square meter				
Phylum Mollusca					
Class Gastropoda					
Buccinum undatum	16.6				
Nassarius trivittatus		41.5	33.2		
Class Bivalvia					
Tellina agilis	16.6	8.3		8.3	24.9
Phylum Annelida					
Class Polychaeta					
Polygordius appendiculatus	16.6				
Eteone lactea	41.5				
Nephtys caeca	24.9				41.5
Exogone dispar	215.8				
Nereis virens		8.3			
Capitella capitata	8.3				
Spio filicornis	74.7		58.1		
Spiophanes bombyx	730.4	58.1	41.5	49.8	124.5
Paraonis fulgens				8.3	8.3
Aricidea jeffreysii	91.3		8.3	8.3	265.6
Stauronereis caecus	16.6				
Scoloplos robustus	8.3	24.9			
Owenia fusiformis	8.3				8.3
Phylum Arthropoda					
Subclass Malacostraca					
Order Cumacea					
Diastylis sculpta	8.3				
Order Isopoda					
Edotea triloba		8.3	8.3		
Erichsonella filiformis					33.2
Order Amphipoda					
Corophium bonelli	141.1	24.9	8.3		
Acanthohaustorius spinosus		8.3			
Phylum Echinodermata					
Class Echinoidea					
Echinarachnius parma		33.2	8.3	16.6	
Total Number of Species:	15	9	7	5	7
Total Number of Individuals: (per square meter)	1419.3	215.8	166.0	91.3	506.3

The soft-shelled clam (Mya arenaria) is harvested in the "Pool" in Biddeford. Ten to twelve licensed shellfishermen collect the clam all year around except during red tide outbreaks (Burden, pers. comm. 1987). The American lobster (Homarus americanus) inhabits the harbor area throughout the year. Lobsters molt during May, June and August, and are harvested in greater amounts during the summer season. Five to eight boats fish for lobster all year long. This number increases to 28-32 boats during the summer, of which 15-20 boats use lobster pots in the harbor. The lobster season in the harbor extends from May to September after which the lobsters migrate to deeper water during the winter months (Burden, pers. comm., 1987).

The ocean quahog (Artica islandica) is harvested outside the harbor in waters deeper than 30 feet. Quahogs outside Wood Island Harbor inhabit a coarse sandy area. Six quahogs between three to four inches were collected during a 10 minute tow north of Wood Island (Card, 1978). Other tows from the Biddeford Pool area captured quahogs from a fine sand substrate.

Marine fish common to the Gulf of Maine would also be expected to forage Wood Island Harbor. Demersal fish such as winter flounder (Pseudopleuronectes americanus), Atlantic cod (Gadus morhua), haddock (Melanogrammus aeglefinus), pollock (Pollachius virens), and sea raven (Hemitripterus americanus) are common residents along the coast of Maine. An important commercial finfish in Maine waters is the Atlantic herring (Clupea harengus harengus) (Brad Sterl, per comm. 1987; Fefer and Schettig, 1980). These fish may transit the project area.

Several species of finfish migrate into Maine waters during the summer season. Hakes (Urophycis chuss, Urophycis tenuis, and Merluccius bilinearis), mackerel (Scomber scombrus), bluefish (Pomatomus saltatrix), and Atlantic menhaden (Brevoortia tyrannus) travel to Maine in response to temperature changes and feeding requirements (Fefer and Schettig, 1980). The Saco River estuary, immediately north of the project area, supports a small spawning run of alewives (Alosa pseudoharengus) and striped bass (Morone saxatilis) populations (NERBC, 1979). The striped bass are a nonbreeding migratory population which feed in the area between May and mid-November. The alewives spawn in freshwater from mid-May to June and reach peak numbers along the coast in late August and September. Other anadromous fish less common to the project area are the Atlantic salmon (Salmo salar) and the American shad (Alosa sapidissima) (Sterl, 1987). A small Atlantic salmon run occurred in Saco River in 1986. A total of eighteen adult fish were caught. Sixteen fish were trapped and released upstream. Industrialization, dam construction, and pollution have reduced the numbers of anadromous fish (NERBC, 1979).

2. Disposal

a. Physical and Chemical

The disposal site is an inter-island sand bar that connects Basket Island to Stage Island. This sand bar is under the jurisdiction of the State of Maine. A tombolo joins Stage Island to Hills Beach and another tombolo connects Basket Island to Hills Beach. These tombolos and the inter-island sand bar are exposed at low tide. It is during low tide that vehicular access is provided to families from Basket Island to Hills Beach. Stage Island is owned by the Maine Audubon Society.

The project area is bordered by Biddeford Pool and Fletcher's Neck to the south, Hills Beach to the west, and the Saco River jetties to the north. Jetties constructed at the mouth of the Saco River reduce sediment transported from the river to beaches north and south of the river (Holmes, 1980). The upper reaches of the Saco River supplies large quantities of sand-sized material to the southern half of Saco Bay. The mineralogy and average grain size of sand samples from the Saco River imply that the river has contributed a large amount of sand to this area (Moreau, 1979).

In general, depending on the time of year, winds in Saco Bay blow from the north or the south (Ferland, 1979). Due to the more consistent south winds of summer, littoral transport moves sand along the coast of Saco Bay from the south to the north. As a consequence, beaches south of the Saco River jetties are less affected by the loss of sediment from the river than the beaches north of the jetties because of sand movement from littoral drift. Thus, except for localized erosional problems near the south jetty, the adjacent tombolos and inter-island sand bar have remained fairly stable during the past 10 to 20 years (Sterl, per. comm., 1988).

Hills Beach has been the site of previous disposal operations from past Federal dredging projects. Dredge material from Saco River in 1969 and Biddeford Pool in 1956 have been used to replenish this beach site.

Soil samples, "1", "2" and "3" were taken from the inter-island sand bar on 4 August 1988 and analyzed for grain size (Figure 4). Samples were taken at the center of the sandbar, and in the subtidal zone seaward of the sand bar. Gradation curves (Appendix A) from the collected samples show the samples to lie between fine and medium sand.

b. Biological

Tombolos connect Basket Island and Stage Island to Hills Beach. Hills Beach is a narrow spit of land dotted with beach houses. These houses abut the sandy beach preventing the establishment of a well-developed beach

dune system. Patches and fringes of beach vegetation, dominated by the American beach grass Ammophila brevigulata occupy a narrow space in front of the houses and in undeveloped areas.

A large tidal flat is exposed at low tide on Hills Beach. The tidal flat located to the north and west (the opposite side of the Basket Island tombolo) contains a productive benthic and soft-shelled clam (Mya arenaria) habitat. Benthic samples collected from this section of the tidal flat on 13 August 1986 revealed a high density of polychaete worms. Three polychaete worms Capitella capitata, Spio filicornis, and Aricidea jeffreysii comprise 86% of the total biomass (number of per square meter) from the intertidal zone. High densities of Capitella capitata is usually indicative of an area receiving some pollution. It is considered to be a highly opportunistic species capable of rapidly recolonizing an area subjected to bioperturbation (James et. al., 1980).

The commercially important soft-shelled clam collected north and west of the Basket Island tombolo showed the greatest average density (38.7/square meter) at the mid-tide zone. These clams are currently unavailable to the public for shellfish harvesting due to high coliform levels. The soft-shelled clam was harvested by commercial fisherman and taken to a depuration site in Scarborough, but the area is also currently closed to commercial fisherman because of high coliform levels due to nearby sewage treatment plants (Carl Burden, per. comm., 1987). There is no worm fishery on the tidal flat.

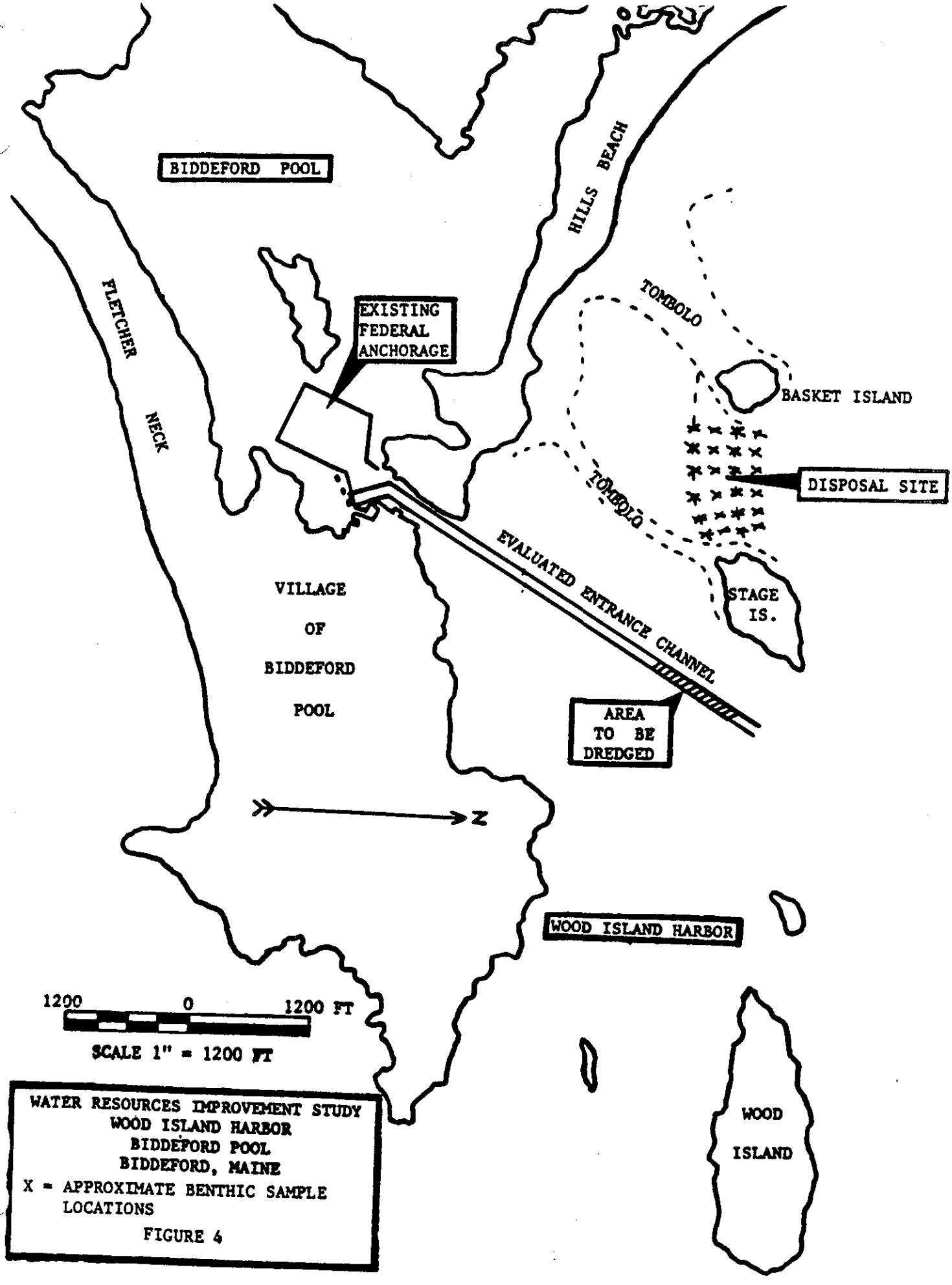
Blue mussels (Mytilus edulis) were observed attached to exposed rocks in the northwest portion of the tidal flat. Exposed rock outcroppings on the tidal flat and along the sides of the islands provides substrate for attachment of the brown rockweeds Fucus sp. and knotted wrack Ascophyllum nodosum. In general, the knotted wrack covers the intertidal rocks below the upper band of rockweeds.

Approximately two thirds of the area located landward of the disposal site, and in between the two tombolos mentioned previously, is exposed at low tide. An eelgrass bed (Zostera marina) is uncovered at low tide on the southeast side of the Basket Island tombolo. The eelgrass bed is located approximately 1,000 feet from the disposal site. Razor clams (Ensis directus) and soft-shelled clams are reported to inhabit the lower intertidal and subtidal areas landward of the disposal sites (Sterl, pers. comm., 1988).

Benthic samples were collected from the disposal site on 4 August 1988 at low tide. Six transects were sampled across the inter-island sand bar. A 0.01 m^2 hand-held box core was used to take samples at the low water mark (landward side), center of the sand bar, low water mark (seaward side), and subtidal (seaward) (Figure 4). Table 5 lists the quantity and species recovered from the disposal site. The intertidal samples are grouped together.

The phylum Annelida, class Polychaeta contained the largest number (7) of species and the highest density (7975.22) of individuals per square meter. The polychaete Paraonis fulgens averaged 6591.26 individuals per square meter or 57.9% of all individuals inhabiting the disposal site. The species Haustorius canadensis, within the order Amphipoda and phylum Arthropoda, contained the second largest (16.4) number of individuals per square meter. The third largest number of individuals (12.7) per square meter were contained by the only genus (Oligochaete) in the class Oligochaete, Phylum Annelida.

The intertidal zone contains five more species than the subtidal zone. The subtidal zone contains a species (Nephtys sp.) not found in the intertidal zone. Although the subtidal zone contains fewer species than the sand bar, the density of species is greater. The Shannon Diversity eveness value (H') of 0.6874 for intertidal samples and 0.4894 for subtidal samples indicates a moderate diversity of individuals and a moderate distribution of individuals in both populations.



WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR
BIDDEFORD POOL
BIDDEFORD, MAINE
X = APPROXIMATE BENTHIC SAMPLE LOCATIONS

FIGURE 4

Table 5

Wood Island Harbor, Maine

Benthic organisms collected from the inter-island sand bar located between Basket Island and Stage Island using a hand held box core ($0.01m^2$) on 4 August 1988.

	Intertidal	Subtidal
	number of species/square meter	
Phylum Mollusca		
Class Bivalvia		
Tellina agilis	11.12	16.67
Macoma calcarea	5.56	--
Phylum Annelida		
Class Polychaeta		
Nephtys sp.	--	66.68
Nereis diversicolor	116.76	16.67
Spio filicornis	272.44	133.36
Streblospio benedicti	5.56	--
Scolelepis squamata	88.96	516.77
Paraonis fulgens	1756.96	4834.30
Scoloplos armiger	100.8	66.68
Class Oligochaeta		
Oligochaete sp.	878.48	566.78
Phylum Arthropoda		
Order Isopoda		
Sphaeroma quadridentatum	5.56	--
Chiridotea sp.	27.8	--
Order Amphipoda		
Ampithoe rubricata	11.12	--
Corophium sp.	16.68	--
Haustorius canadensis	795.08	1066.88
Total number of species:	14	9
Total number of individuals:	4092.16	7284.79

Hills Beach and adjacent areas are an important migratory, resting and feeding area for numerous shorebirds and raptors. Shorebirds observed during a 13 August 1986 field trip included sanderlings (Calidris alba), semipalmated plover (Charadrius semipalmatus), black-bellied plover (Pluvialis squatarola), semipalmated sandpipers (Calidris pusilla), greater yellowlegs (Tringa melanoleuca), and ruddy turnstone (Arenaria interpres). Other birds in the area include herring gull (Larus argentatus), greater black-backed gulls (Larus marinus), ring-billed gulls (Larus delawarensis), common terns (Sterna hirundo), arctic terns (Sterna paradisaea), black-crowned night herons (Nycticorax nycticorax), common eider (Somateria mollissima), and double-crested cormorants (Phalacrocorax auritus). An adult peregrine falcon (Falco peregrinus) was observed chasing plovers over the mudflats near Stage Island.

Several hundred double-crested cormorants (Phalacrocorax auritus) were observed on 25 August 1988 by staff of the U.S. Fish and Wildlife Service (letter, 1 Sept. 1988) feeding in the shallow waters between Stage and Basket Island. These birds were later seen roosting on the rocky shores of Stage Island. A pair of northern harriers (Circus cyaneus) was seen hunting over Stage Island and the surrounding tidal flats.

Several islands in the project area are used as nesting sites for some of the birds observed. Ram Island, Stage Island, Negro Island, Gooseberry Island, and Wood Island support nesting populations of herring gull and great black-backed gull. Wood Island also supports nesting pairs of snowy egret (Egretta thula), glossy ibis (Plegadis falcinellus), and black-crowned night heron (Nycticorax nycticorax) (Erwin and Korschgen, 1979).

Another biological resource expected in the vicinity of Wood Island and other islands is the harbor seal. The harbor seal is the most common seal in the coastal waters of Maine. It can be found throughout the year on small islands and half-tide ledges along the coast. The harbor seal is well distributed in all embayments in Maine (Fefer and Schettig, 1980). It is not expected to be impacted by the proposed project.

3. Threatened and Endangered Species

Coordination with the U.S. Fish and Wildlife Service and National Marine Fisheries Service shows that except for occasional transient individuals, no Federally listed or proposed species are known to exist in the project impact area.

4. Historic and Archaeological Resources

Biddeford Pool and Wood Island Harbor have been important anchorages since the early 17th century. Biddeford Pool, originally known as Winter Harbour, was occupied by English settlers on and off in 1616-17, 1630-75 and after 1708. There are six known shipwrecks in the vicinity of the proposed project area. All of these shipwrecks occurred during the late

19th to early 20th century. However, given the extensive maritime activity which has taken place in this area over the centuries, there is the distinct possibility that undocumented 18th and early 19th century shipwrecks are also present in the area.

The underwater topography of the area to be dredged includes a rapid drop in ocean floor depth from approximately 10 feet to 27 feet depth. According to the Maine State Historic Preservation Officer, this topographic configuration is likely to have been a beach connecting Stage, Negro and Wood Island, at some time around 7000 to 3000 years ago. This area of submerged land deposits has the potential to contain prehistoric archaeological sites.

5. Social and Economic Resources

Wood Island Harbor is located in Biddeford, a southern coastal city in Maine with a population of 19,638 (U.S. Census, 1980). The economy of Biddeford is primarily based on manufacturing, with factories producing plastics, machinery and electronic equipment. These industries have enjoyed moderate economic growth over the last eight years. The economic break-down of Biddeford shows an increasing percentage of employment directed toward the service industry. The service industry is made up of individuals trained in a particular profession. The greatest number of professionals are doctors, including both physicians and surgeons. An increasing percentage of the labor market is directed towards the service industry as well as a large percentage remaining in the retail trade section.

Much of Biddeford depends on the seasonal influx of summer tourism which contributes to sustained economic growth. The retail sector is an important indicator of economic growth in the community. Summer tourism creates consumer demand for products, especially in the retail trade sector. As a result, an increasing number of shops and stores enter the market to reap profits caused by these cyclic fluctuations in the economy. In the Biddeford and Wood Island area, seasonal fluctuations stimulate needed economic activity and growth in the economy. The chart below shows a general break-down of the component parts of the retail trade industry.

Industry Analysis of Biddeford, Maine

Type of Industry	Number of Firms	Percent
A. Professional Service		
1. Law firms	5	6.25%
2. Accounting Firms	1	1.25%
3. Banks	4	5.00%
4. Dentists	16	20.00%
5. Engineers	9	11.25%
6. Optometrists	9	11.25%
7. Physicians, Surgeons	36	45.00%
Total	80	100.00%
B. Retail Industry		
1. Clothing - Men's and Women's	10	15.6%
2. Department Store	5	7.8%
3. Florists	7	10.9%
4. Furniture Stores	8	12.5%
5. Gift Shops	4	6.2%
6. Grocers	23	39.9%
7. Hardware	4	6.2%
8. Hobby, Craft Shops	3	.9%
Total	64	100.0%
C. Insurance and Real Estate		
1. Insurance Agencies	14	29.2%
2. Real Estate Agents and Brokers	34	70.8%
Total	48	100.0%
D. Restaurants and Taverns	33	
Industry Total in Percent Evaluation		
1. Professional Service	80	35.6%
2. Retail Industry	64	28.4%
3. Insurance and Real Estate	48	21.3%
4. Restaurant, Tavern	33	14.7%
Total	225	100.0%

While Biddeford Pool is not a large commercial fishing port, it has significant value within the local economy. Biddeford is in York County which contributes only about 4% to the statewide value of commercial fishing. In 1984, 5,088,020 pounds of fish valued at $4,535,714 (National Marine Fisheries Service, Data Management and Statistics Division) were landed and sold in York County. Biddeford Pool/Wood Island Harbor contributed $2,500,000 or 55% to this figure.

The commercial fishing fleet at Wood Island Harbor is small but well organized. The fishermen have been instrumental in providing major improvements to Fishermans Wharf at Biddeford Pool. The $80,000 for these improvements was financed through a Farmers Home Administration loan obtained by members of the Biddeford Pool Fishermen's Association.

The commercial fleet consists of 23 year round vessels varying in size from 18 ft. to 54 ft. Three of these vessels are dragger/trawlers while remaining vessels are lobster boats. Five lobster boats also contain gillnetting equipment. The draggers make 60 trips per year, remaining at sea for three days on each trip. The lobster (and gillnetting) boats make between 225 and 250 trips during the 42 ice free weeks per year and work the area immediately around the harbor.

Local fisherman have expressed an interest in improvements to the entrance channel to cut down on operating costs, specifically related to fuel consumption. In addition, there is a growing need for a larger anchorage space within the Pool. The fishermens' primary interest in expanding the anchorage is to accommodate larger boats which would help diversify their operations. Lobster fishing has been declining for the last few years and many fishermen are finding it necessary to expand to include gillnetting equipment.

Wood Island Harbor is growing in popularity as a recreational harbor. The recreational boating season lasts approximately 90 days: from mid-June to mid-September. The monetary outlay to keep a pleasure boat in Wood Island Harbor is significantly less than at a nearby port such as Portland or Kennebunkport. A membership in the Biddeford Yacht Club is $200 (1986) per year. Moorings are purchased by each member from a local boat yard which also places the moorings. The majority of recreational moorings are placed in the less protected outside harbor and the yacht club runs a motor tender between their wharf (just inside the gut) and the moorings. The yacht club currently lists 120 members with 78 vessels. There are also approximately 20 boat owners on their waiting list.

In addition to the commercial and recreational fleet based at Biddeford/Pool Wood Island at least three transient vessels visit the harbor each night. These vessels are also tied up in the outside harbor.

E. Environmental Consequences

1. Dredging Site

a. Physical and chemical

Since the original Corps survey conducted in 1947, a shoal has developed and grown across the natural entrance channel through Wood Island Harbor. This shoal had minimum depths of 8.5 feet below MLW in 1947 and 6.9 feet in 1963. Today the top of the shoal is 6.0 feet below MLW. During periods of extreme low tides, there may be only as much as four feet of

water clearance over the shoal. Historical evidence suggests that the navigation improvement channel would not require maintenance dredging for approximately twenty-five years.

Shoaling of the proposed navigation channel area has resulted in the need for dredging to allow safe passage of fishing vessels. Dredging the proposed channel to 10 feet MLW in Wood Island Harbor will be accomplished by means of a hydraulic dredge. The hydraulic dredge will pump the substrate from the bottom in a slurry containing 80% water and 20% sediment. This type of dredge produces minimal amounts of turbidity in the surrounding water at the dredge site. The small percentage of dredged material that becomes suspended in the water column will rapidly settle out due to the sandy nature of the sediment. Therefore, any turbidity effects associated with the dredge activity will be minor and cease with the completion of the operation.

The capacity of sand grains to adsorb trace metals and organic contaminants is much less than that of silts and clays. The bulk chemistry test results (Table 1) support the conclusion that negligible amounts of trace metals and organic contaminants are associated with the substrate. Release of contaminants, if any, to the water column will not be significant.

b. Biological

The dredging of 16,000 cubic yards of substrate from the proposed channel will destroy the benthic habitat and associated organisms by physical removal. Mobile species such as finfish and large macro-invertebrates such as crabs should be able to avoid the dredging area.

Several studies have been conducted to investigate the recolonization of benthos to dredged areas. The first settlement of benthos is characterized by opportunistic polychaetes and immigration of mobile crustaceans. Recovery of the benthos to pre-dredge levels occurred within a year in Monterey Bay (Oliver, et. al., 1977). Species recolonization are dependent on ambient population fluctuations. Thus, the spring and summer seasons will experience the greatest recolonization of the habitat coinciding with the increased fluctuation in the ambient population (Zajac and Whitlatch, 1982).

The polychaetes Spiophanes bombyx, Aricidea jeffreysii, and Exogone dispar account for 66.4% of the total biomass (number per square meter) from the proposed channel. The diverse assemblage of species (Table 3) is indicative of a successional community. Spiophanes bombyx is also a pioneering species and will be able to establish itself after dredge activity through adult and larval recruitment. This species will rework the sediment providing suitable habitat for other organisms. The community should return to its pre-dredged levels within two years.

Significant realignment of the proposed navigation channel to avoid eelgrass would not be practical. Stage Island located to the west and rocks located to the east prevent adjustment of the proposed navigation channel from its present site. The shoal area that would be dredged for the proposed navigation channel extends from Stage Island to the Biddeford Pool headland. Therefore it is not possible to limit or significantly reduce the area to be dredged by moving the proposed location of the navigation channel.

Culms of eelgrass inhabiting the proposed channel will be removed by the dredge activity. Species dependent on eelgrass for foraging or shelter will be temporarily displaced. However, less than 17 percent of the proposed dredge area contains eelgrass. Scattered patches of eelgrass in Wood Island Harbor may offset the temporary loss of eelgrass from the proposed dredge area. Eelgrass meadows maintain themselves to a large degree by vegetative reproduction. The primary factor limiting the depth and up-estuary penetration of eelgrass is light availability. Estuaries that are less turbid, such as the ones in New England, allow light penetration to greater depths so that eelgrass may grow to depths exceeding 10 meters (Thayer et al., 1984). Since depth will not be a limiting factor, eelgrass recolonization of the dredged site from meadows adjacent to the proposed navigation channel should occur through vegetative and sexual reproduction.

2. Disposal Site

a. Physical

The location of the tombolos and inter-island sand bar in the project area suggest that Basket Island and Stage Island produce a shadow effect by reducing the amount of wave energy reaching Hills Beach. This reduction in wave energy allows sandy material carried by waves to settle and accumulate.

The use of a hydraulic dredge will cause localized turbidity during release of the dredged material at the disposal site. Disposal of the dredged material will occur on the seaward side at the inter-island sand bar. Movement of dredged material will most likely be influenced by the direction of the tide and the tide height at the time of disposal. During outgoing tides, slack tide, and incoming tides to the height of the sand bar, minimal movement of dredged material towards the tidal flats would be expected. This is due to the low energy attributed to these tides and the use of the sand bar as a barrier against the landward movement of the dredged material. During high tide or flood tide an increase in turbidity and movement of the slurry in the direction of the tide would be expected as dredged material is released from the hydraulic pipeline. Due to the sandy nature of the material (<4% fines) to be dredged, any material which is placed in suspension should settle out rapidly. The level of turbidity should cease with the completion of the dredging project.

The slurry will be spread seaward of the sand bar and between Basket Island and Stage Island. Disposal will begin near the center of the sand bar and move towards Basket Island. Limiting disposal of dredged material during outgoing tides, slack tides, and incoming tides to the top of

the sand bar, will reduce landward movement of dredged material. The sand bar should also minimize movement of sand to the landward and tidal flat area of Hills Beach.

Once the dredged material has settled, the new beach face will be subject to the same tidal influences as other coastal geomorphological features in the project area. Tidal currents in the project area will work the dredged material and distribute it between the two islands. The dredged material would not be expected to stay in a cohesive mound but be reduced to inches of sediment in the project area. The new height and configuration of the sand bar will not interfere with tidal flows entering or leaving the area landward of the sand bar. The Stage Island and Basket Island tombolos would still allow the same level of flooding of the landward area behind the disposal site.

People can reach Stage Island by foot. The deposition of the dredged material is not expected to significantly increase the height of the sand bar to increase vehicle access to Stage Island. The rocky outcrop bordering this island would continue to deter vehicles from accessing upland portions of this island or shorelines not adjacent to the bar.

Water quality will not be altered by project activities. The dredged material being placed on the inter-island sand bar contains insignificant amounts of contaminants (Table 1). Only a slight reduction, if any, of dissolved oxygen is expected at the disposal site and dredge site. This is due to the low amount of organic material in the dredged material and tidal flushing in the project area. A small truck may be needed to conduct operations, such as positioning the pipe, on the tombolo during low tide. Vehicles currently access Basket Island through use of the tombolo. Additional vehicle use on a temporary basis should not significantly affect biological resources at the disposal site.

b. Biological

The disposal of approximately 16,000 cubic yards of sandy dredged material seaward of the inter-island sand bar will impact the sand bar and adjacent subtidal areas seaward of the sand bar. Most of the benthic fauna inhabiting the subtidal area will be destroyed by burial. Some of the larger polychaetes species, such as Nephtys sp. and Nereis diversicolor may be able to move through the dredged material.

The polychaetes Paraonis fulgens, Scolelepis squamata, Oligochaete spp., and the amphipod Haustorius canadensis account for 95% of the biomass (number per square meter) in the subtidal area. Table 5 lists the benthic species found subtidally. Ovigerous amphipod females are present from May to September and can produce a brood per season. Polychaete species produce brood in the spring.

The natural action of the waves in the winter may disperse some of the dredged material over the tidal flat. Depositing the dredged material during slack tides and seaward of the sand bar will reduce the amount of dredged material deposited landward. Recovery of those areas impacted by

large amounts of sand should occur within a short period of time. Parr, Diener, and Lacy (1978) noted an increase in species abundance just five weeks after beach nourishment. The elevated numbers were due primarily to increases in motile crusteacean species. Many benthic species are able to withstand some sand burial as would occur during a storm. Similar physical characteristics between the dredged material and the disposal site should facilitate recolonization. Placing the dredged material on the sand bar between October 1 through the end of March allows the substrate to settle and avoids the spawning period of shellfish and other benthic invertebrates.

Fish and macroinvertebrates occupying the project area should be able to avoid the work site. Subtidal areas adjacent to the project area can serve as forage areas. Subtidal areas directly impacted by burial should be near pre-disposal levels within two growing seasons.

Birds and wildlife inhabiting or transiting the project area may be temporarily disrupted by dredging operations. The dredging and disposal sites will not be available for feeding while dredging is in progress. However, a reduction in forage areas may be offset by organic material (such as seaweeds, eelgrass and benthic organisms) transported through the hydraulic pipeline from the dredging site. The organic material released at the end of pipeline may be used as food by birds and other wildlife. The dredging and disposal areas should return to pre-dredging feeding levels within a few years.

Noise disturbance is expected to be minimal as dredged material is transported through the pipeline and released at the disposal site. Birds roosting on Stage Island should not be disrupted by dredging activity once the pipe is in place. Birds expected to be in the project area during the winter are ducks (eiders), gulls, and great comorants (Arbuckle, 1988). Loons may also be found near Saco River during this time of year (Arbuckle, 1988). Noise and dredge activity would not be expected to disturb these birds during dredging operations (Arbuckle, 1988).

3. Threatened and Endangered Species

Based on determinations by the National Marine Fisheries Service and the Fish and Wildlife Service, the proposed projects should not affect any Federally listed threatened or endangered species (see Appendix C).

4. Historical and Archaeological Resources

The proposed project is in an area of historic and prehistoric archaeological potential. However, due to the nature of the dredged material (fine sand), and its recent deposition, the proposed project area should have a low potential for containing archaeological sites.

The proposed Basket Island disposal site is part of a tombolo system which is of archaeological interest. Similar sand bars have been found to contain prehistoric archaeological sites. However, based on background research of the geomorphology of the area, any prehistoric site or shell middens would either have been destroyed or deeply buried by the dynamic nature of the tombolo system.

We feel, therefore, that this proposed Federal Navigation Improvement project is unlikely to have an effect upon any structure or site of historic, archaeological or architectural significance as defined by the National Historic Preservation Act of 1966. The Maine Historic Preservation Commission in a letter dated 13 January 1989, has concurred with this finding.

5. Social and Economic Resources

Navigational improvements are recommended to ensure the economic vitality of the community. Much of the commercial and recreational benefits derived from activities related to the Wood Island area depend upon these improvements. Recreational benefits, in the form of swimming, fishing, and boating are essential aspects that ensure the survival of summer tourism. A reduction in the recreational and commercial activities related to Wood Island would have a negative impact on the economy of Biddeford. Since seasonal fluctuations help to maintain a variable growth rate in the economy, a reduction in commercial and recreational benefits would constrain the economic ability of Biddeford to sustain growth.

F. Mitigation

The following actions will be taken to reduce impacts to biological resources in the area.

1. Dredging operations will be scheduled from October 1 through the end of March to avoid shellfish spawning periods.

2. Disposal will occur on the seaward side of the inter-island sand bar located between Basket Island and Stage Island, begin near the center of the sand bar and move towards Basket Island.

3. Disposal will occur during slack tide, outgoing tides, and incoming tides to the top of the sand bar to reduce impacts to tidal flats located landward of the inter-island sand bar.

G. Coordination

In preparation of this environmental assessment, many Federal, State, and local agencies and officials were contacted. The proposed work was coordinated with the following agencies and interested parties:

Federal

U.S. Fish and Wildlife Service
400 Ralph Pill Marketplace
22 Bridge Street
Concord, New Hampshire 03301-4901

National Marine Fisheries Serivce
Habitat Conservation Branch
Two State Fish Pier
Gloucester, Massachusetts 01930-3097

U.S. Environmental Protection Agency
Region 1
JFK Federal Building
Boston, Massachusetts 02203

State

Maine Historic Preservation Commission
55 Capitol Street
Augusta, Maine 04333

State of Maine Planning Office
State House Station 38
184 State Street
Augusta, Maine 04333

Maine Department of Environmental Protection
State House Station 17
Augusta, Maine 04333

Maine Department of Conservation
State House Station 22
Augusta, Maine 04333

Maine Department of Inland Fisheries and Wildlife
State House, Station 41
Augusta, Maine 04333

Maine Department of Marine Resources
State House Station 21
Augusta, Maine 04333

Maine Audubon Society
Falmouth, Maine

Local

Harbormaster
Biddeford Pool, Maine

Shellfish Officer
Marine Patrol Resources
RR4, Street 37
Biddeford, Maine

H. References

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Moreau, Marcel et al. 1979. A study of beach processes and management alterntaives for Saco Bay. NOAA, Coastal Program of the Maine State Planning Office. 82 pp.

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Thayer, G.W., W.F. Kenworthy, and M.S. Fonseca. 1984. The ecology of eelgrass meadows of the Atlantic Coast; A community profile. U.S. Fish and Wildlife Service FWS/OBS-84/02. 147 pp.

Zajac, R.N. and R.B. Whitlatch. 1982. Responses of estuarine infauna to disturbance. Marine Ecology - Progress Series, Vol. 10; 1-14, 15-27.

I. Compliance Table

The compliance status of this project with Environmental Protection Statutes and Executive Orders is as follows:

COMPLIANCE WITH ENVIRONMENTAL FEDERAL STATUTES AND EXECUTIVE ORDERS

1. Preservation of Historic and Archaeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq.

Compliance: Not Applicable; project does not require mitigation of historic or archaeological resources at this time.

2. Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Compliance: Submission of this report, upon request, to the Regional Administrator of the Environmental Protection Agency for review pursuant to Sections 176c and 309 of the Clean Air Act signifies partial compliance.

3. Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.

Compliance: A Section 404(b)(1) Evaluation and Compliance Review have been incorporated into this report. An application shall be filed for State Water Quality Certification pursuant to Section 401 of the Clean Water Act.

4. Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1431 et seq.

Compliance: A CZM consistency determination shall be provided to the State for review and concurrence that the proposed project is consistent with the approved State CZM program.

5. Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Compliance: Coordination with the U.S. Fish Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) has yielded no formal consultation requirements pursuant to Section 7 of the Endangered Species Act.

6. Estuarine Areas Act, 16 U.S.C. 1221 et seq.

Compliance: Not Applicable; this report is not being submitted to Congress.

7. Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Compliance: Coordination with the National Park Service (NPS) and Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

8. Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Compliance: Coordination with the FWS, NMFS and Maine Department of Marine Resources signifies compliance with the Fish and Wildlife Coordination Act.

9. Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq

Compliance: Notifying the National Park Service (NPS) and Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

10. Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq.

Compliance: Not Applicable; project does not involve the transportation nor disposal of dredged material in ocean waters pursuant to Sections 102 and 103 of the Act, respectively.

11. National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.

Compliance: Not applicable; project does not require mitigation of historic or archaeological resources at this time.

12. National Environmental Policy Act of 1969, as amended, 42 U.S.C. 432 et seq.

Compliance: Preparation of this report signifies partial compliance with NEPA. Full compliance shall be noted at the time the Finding of No Significant Impact is issued.

13. Rivers and Harbors Appropriation Act of 1899, as amended, 33 U.S.C. 401 et seq.

Compliance: No requirements for Corps projects or programs authorized by Congress. The proposed navigation improvement project is pursuant to the Congressionally-approved continuing authority program; i.e. Section 107 of the River and Harbor Act of 1960.

14. Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 et seq.

Compliance: No requirements for Corps activities.

15. Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 et seq.

Compliance: Not Applicable; project is located within the marine environment.

Executive Orders

1. Executive Order 11988, Floodplain Management, 24 May 1977 as amended by Executive Order 12148, 20 July 1979.

Compliance: Not Applicable; project is not located within a floodplain.

2. Executive Order 11990, Protection of Wetlands, 24 May 1977.

Compliance: Circulation of this report for public review fulfills the requirements of Executive Order 11990, Section 2(b).

3. Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.

Compliance: Not Applicable; project is located within the United States.

Executive Memorandum

1. Analysis of Impacts of Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980.

Compliance: Not applicable; project does not involve nor impact agricultural lands.

Wood Island Harbor
Biddeford, Maine

Environmental Assessment
Section II
Section 404 (b)(1) Evaluation

NEW ENGLAND DIVISION
U.S. ARMY CORPS OF ENGINEERS, WALTHAM, MA
SECTION 404(b)(1) EVALUATION

PROJECT: Wood Island Harbor, Biddeford, Maine

PROJECT MANAGER: Mr. Christopher Hatfield Telephone: (617) 647-8520

FORM COMPLETED BY: Ms. Catherine Demos Telephone: (617) 647-8231

PROJECT DESCRIPTION: The establishment of a commercial navigation channel from the gut at Biddeford Pool to deep water in Wood Island Harbor would improve access by reducing navigational risks and delays due to shoaling. Approximately 16,000 cubic yards of material would be removed to form a 100-foot wide and 10-foot deep channel. The dredged material would be hydraulically pumped from the channel to the seaward side of an inter-island sand bar located between Basket Island and Stage Island.

NEW ENGLAND DIVISION
U.S. ARMY CORPS OF ENGINEERS, WALTHAM, MA
PROJECT: Wood Island Harbor, Maine Navigation Improvement Dredging

SHORT FORM
Evaluation of Section 404(b)(1) Guidelines

1. Review of Compliance Sect. 230.10(a)-(d). Final

A review of the permit application indicated that:

a. The discharge represents the least environmentally damaging practicable alternative and if a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose unless there are no practicable alternatives to the proposed activity. (If no, see section 2 and information gathered for EA alternative); YES X NO

b. The activity does not appear to 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA: 2) jeopardize the existence of Federally listed endangered or threatened species or their habitat: and 3) violate requirements of any Federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies); YES X NO

c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages

of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2)

YES X NO ___

d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5).

YES X NO ___
Proceed to Sec.2

2. Technical Evaluation Factors (Subparts C-F)	N/A	Not Significant	Significant
a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C).			
1) Substrate impacts.		X	
2) Suspended particulates/turbidity impacts.		X	
3) Water column impacts.		X	
4) Alteration of current patterns and water circulation.		X	
5) Alteration of normal water fluctuations/hydroperiod.		X	
6) Alteration of salinity gradients.	X		
b. Biological Characteristics of the Aquatic Ecosystem (Subpart D).			
1) Effect on threatened/endangered species and their normal habitat.	X		
2) Effect on the aquatic food web.		X	
3) Effect on other wildlife (mammals, birds, reptiles and amphibians).		X	
c. Special Aquatic Sites (Subpart E).	N/A	Not Significant	Significant
1) Sanctuaries and refuges.	X		
2) Wetlands.	X		
3) Mud flats.		X	
4) Vegetated shallows.		X	
5) Coral reefs.	X		
6) Riffle and pool complexes.	X		

	N/A	Not Significant	Significant
d. Human Use Characteristics (Subpart F).			
1) Effects on municipal and private water supplies.	X		
2) Recreational and Commercial fisheries impacts.		X	
3) Effects on water-related recreation.		X	
4) Aesthetic impacts.		X	
5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites and similar preserves.	X		

Remarks: Explanation of identified significant impacts.

3. Evaluation of Dredged or Fill Material (Subpart G).

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

1) Physical characteristics..... X
2) Hydrography in relation to known or anticipated sources of contaminants..... ___
3) Results from previous testing of the material or similar material in the vicinity of the project..... ___
4) Known, significant sources of persistent pesticides from land runoff or percolation..... ___
5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances..... ___
6) Other public records of significant introduction of contaminants from industries, municipalities or other sources..... ___
7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment By man-induced discharge activities..... ___
8) Other sources (specify)..... ___

List appropriate references.

1. Substrate from the dredged site ranges from medium to silty fine sand.

b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to require constraints. The material meets the testing exclusion criteria. YES X NO ___

4. Disposal Site Delineation Sect. 230.11(f).

a. The following factors as appropriate, have been considered in evaluating the disposal site.

1) Depth of water at disposal site..... X
2) Current velocity, direction and variability at disposal site..... X
3) Degree of turbulence..... X
4) Water column stratification..... ___
5) Discharge vessel speed and direction..... ___
6) Rate of discharge..... ___
7) Dredged material characteristics (Constituents, amount and type of material, settling velocities)..... X
8) Number of discharges per unit of time..... ___
9) Other factors affecting rates and patterns of mixing (specify)..... ___

List appropriate references.

Wood Island Harbor, Section 107, Environmental Assessment

b. An evaluation of the appropriate factors in 4a above indicated that our disposal site and/or size of mixing zone are acceptable. YES X NO ___

5. Actions to Minimize Adverse Effects (Subpart II).

All appropriate and practicable steps have been taken, through application of recommendation of Sect. 230.70-230.77 to ensure minimal adverse effects of the proposed discharge. YES X NO ___

List actions taken

1) Dredge activity will take place between October through the end of March for approximately three weeks to avoid shellfish spawning and avian use of the area, and will be placed in an area containing minimal shellfish species. The dredged material is compatible with the substrate at the disposal site. The dredged material will be placed on the seaward side of the inter-island sound bar during tides, slack tides, and incoming tides to the top of the sand bar to minimize impacts to tidal flats landward of the sand bar.

6. Factual Determination (Sect. 230.11).

All review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short or long-term environmental effects of the proposed discharge as related to:

a.	Physical substrate at the disposal site (review section 2a, 3, 4, and 5 above).	YES X	NO ___
b.	Water circulation, fluctuation and salinity (review sections 2a, 3, 4, and 5).	YES X	NO ___
c.	Suspended particulates/turbidity (review sections 2a, 3, 4, and 5)	YES X	NO ___
d.	Contaminant availability (review sections 2a, 3, and 4)	YES X	NO ___
e.	Aquatic ecosystem structure and function (review sections 2b and c, 3, and 5)	YES X	NO ___
f.	Disposal site (Review sections 2, 4, and 5)		
g.	Cumulative impact on the aquatic ecosystem .	YES X	NO ___
h.	Secondary impacts on the aquatic ecosystem.	YES X	NO ___

7. Findings.

a. The proposed disposal site for discharge of dredged or fill material complies with Section 404(b)(1) guidelines..... X

10 Apr 90
DATE

Daniel M. Wilson
Colonel, Corps of Engineers
Division Engineer

Wood Island Harbor
Biddeford, Maine

Environmental Assessment
Section III
Finding of No Significant Impact

FINDING OF NO SIGNIFICANT IMPACT

The proposed Small Navigation Improvement Project at Wood Island Harbor at Biddeford, Maine will provide for the establishment of a commercial navigation channel from the gut at Biddeford Pool to deep water in Wood Island Harbor. This would involve hydraulically dredging the material from a 100-foot wide and 10-foot deep navigation channel and disposing of the material on the seaward side of an inter-island sand bar located between Stage Island and Basket Island. Approximately 16,000 cubic yards of sandy material will be dredged.

The Finding of No Significant Impacts, from information presented in the Environmental Assessment, is attributable to the following considerations:

1) The temporary loss of a benthic community would not cause sustained or substantial impact to the ecological integrity of the region's aquatic resources. The benthic community is expected to reestablish itself within a few years.

2) The proposed project will not affect any endangered and/or threatened species, or cultural resources.

3) The dredging operations will be scheduled during the period October 1 through the end of March. This will minimize impacts to the spawning shellfish populations, avian and recreational users of the area.

4) The generation of suspended material and turbidity will cease with discontinuation of dredge activity and will be localized due to the coarse nature of the material being dredged. No other water quality impacts are anticipated.

5) Coordination with appropriate Federal and State agencies insured that concerns and suggestions were made known to the Corps which were considered in the planning process. These agencies expressed no overriding environmental concerns associated with this project.

6) The proposed project complies with all applicable Environmental Statues and Executive Orders.

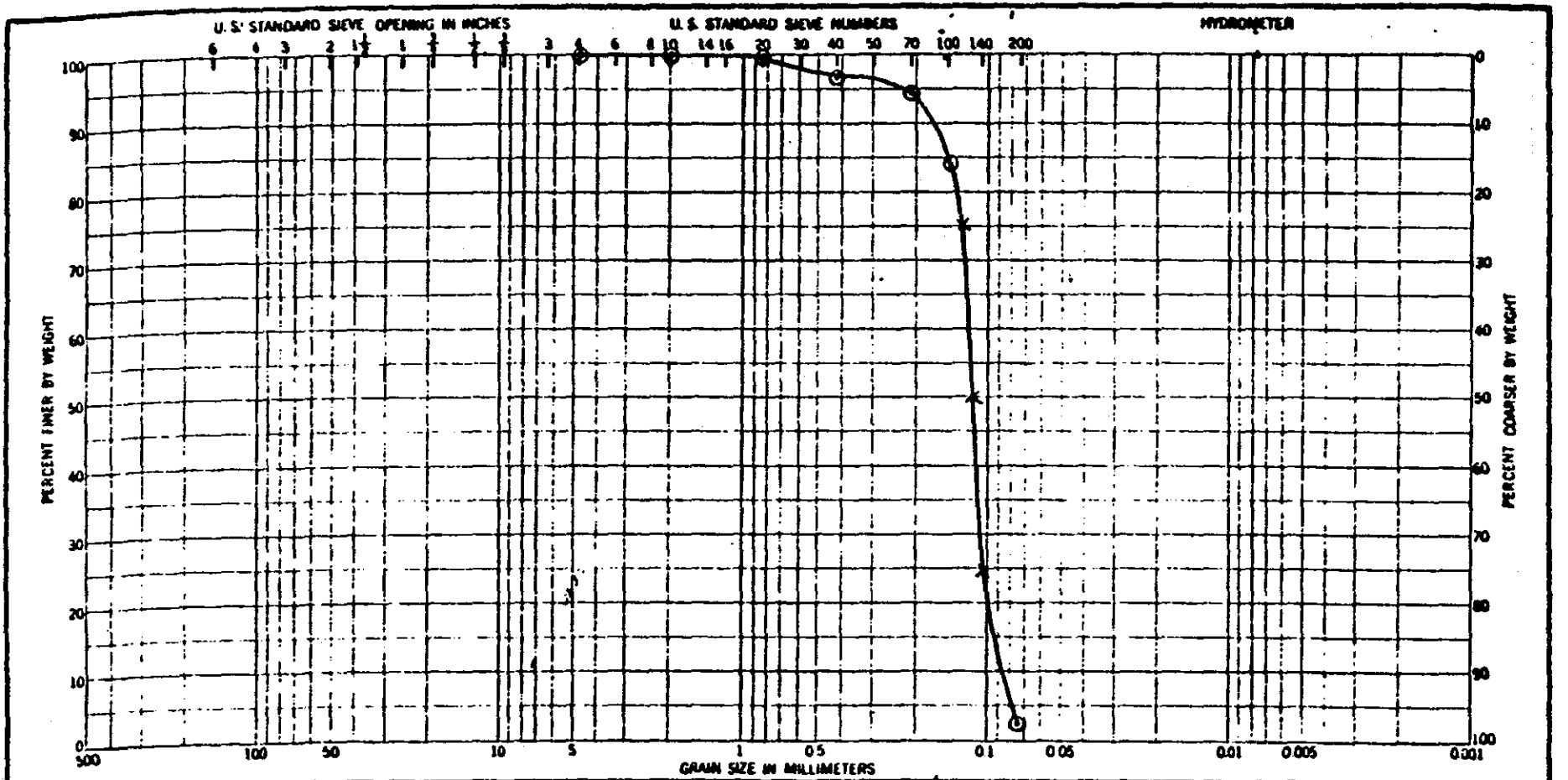
Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that this Wood Island Navigation Improvement Project is not a major Federal action significantly affecting the quality of the human environment and is, therefore, exempt from requirements to prepare an Environmental Impact Statement.

10 Apr 90
DATE

Daniel M. Wilson
Colonel, Corps of Engineers
Division Engineer

APPENDIX A

GRAIN SIZE ANALYSIS



Sample No	Elev or Depth	Classification	Nat w %	LL	PL	PI
H		Dk. gray - f SAND (SP) w/ mica				
		Sp. Gr. = 2.68				

GRADATION CURVES

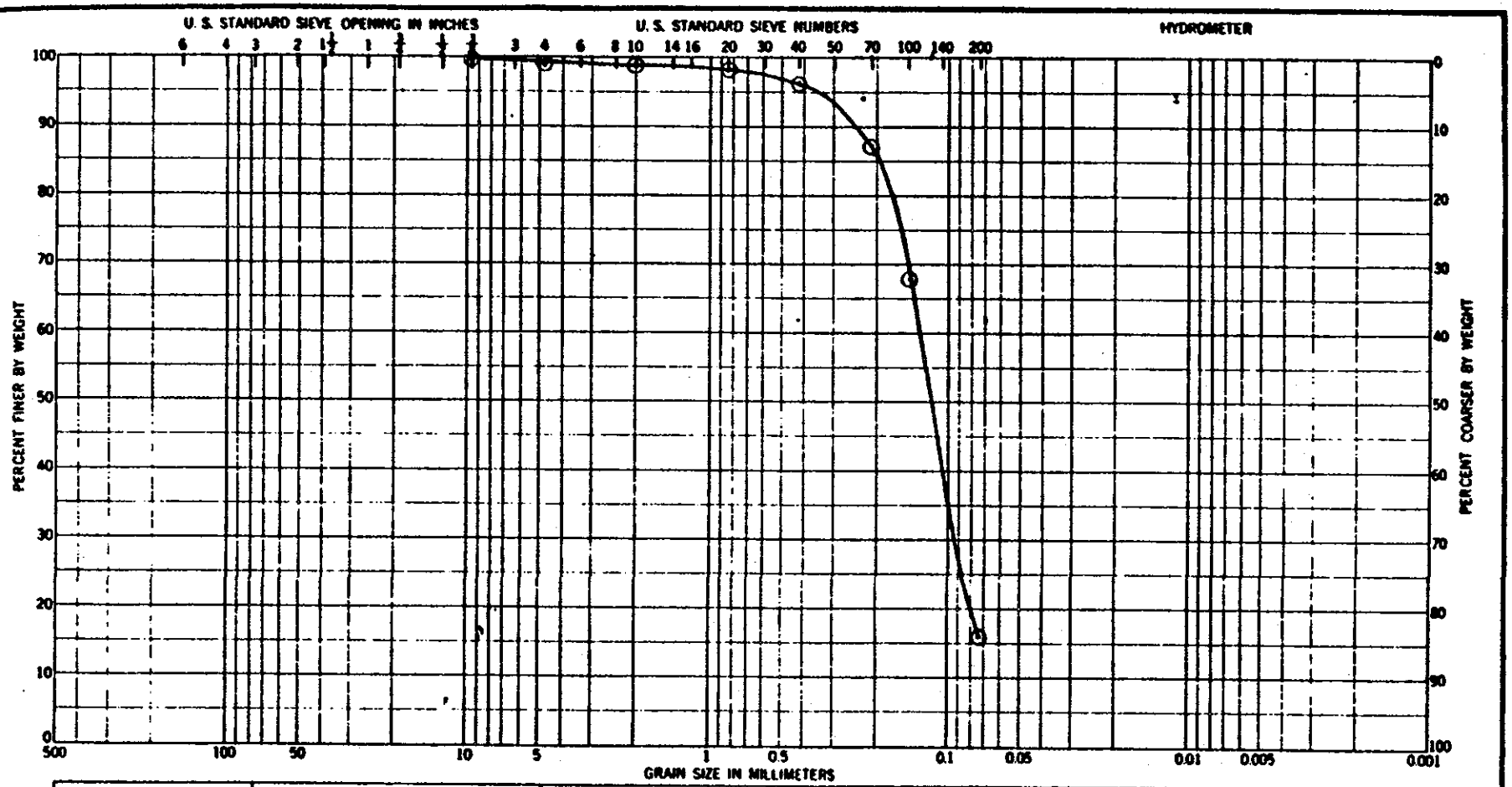
Project: BIDDEFORD POOL, ME

Area: H

Boring No.: 100-370-8

Date: 12/16/83

ENG FORM 1 MAY 83 2087

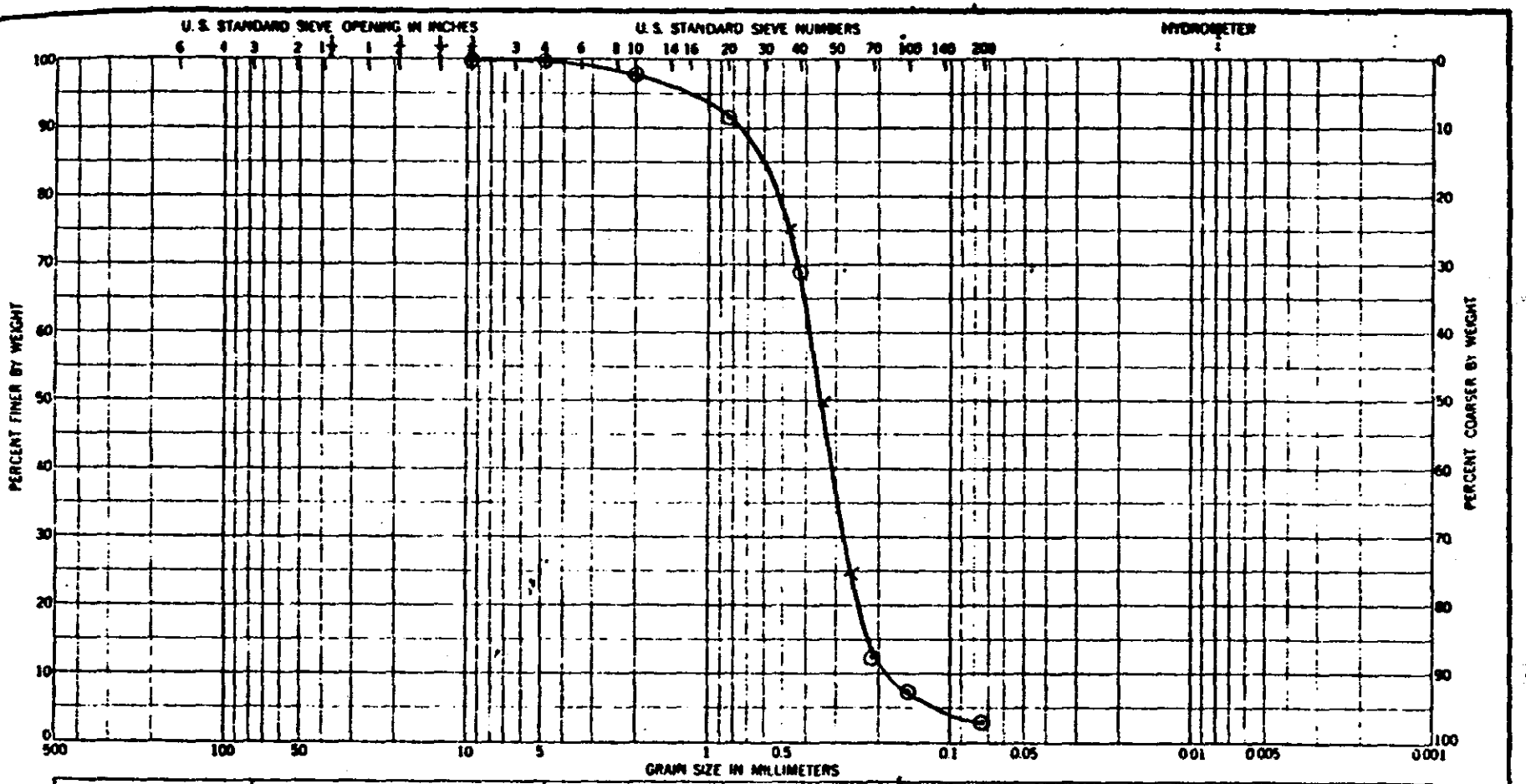


Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
I		DK gray - silty ~f~ SAND (SM) w/ shell frag & mica				

GRADATION CURVES

Project: WOOD ISLAND BIDDEFORD POOL ME.
Area: I
Boring No.: LAB SER 100-370-9
Date: 1/25/84

ENG FORM 1 MAY 83 2087



Sample No.	* Elev or Depth	Classification	Nat w %	LL	PL	PI
J		Brown - m - f SAND (SP) w/shell frag + mdr. cdcr				
		Sp. Gr. = 2.67				

GRADATION CURVES

Project: BIDDEFORD POOL, ME

Area: J

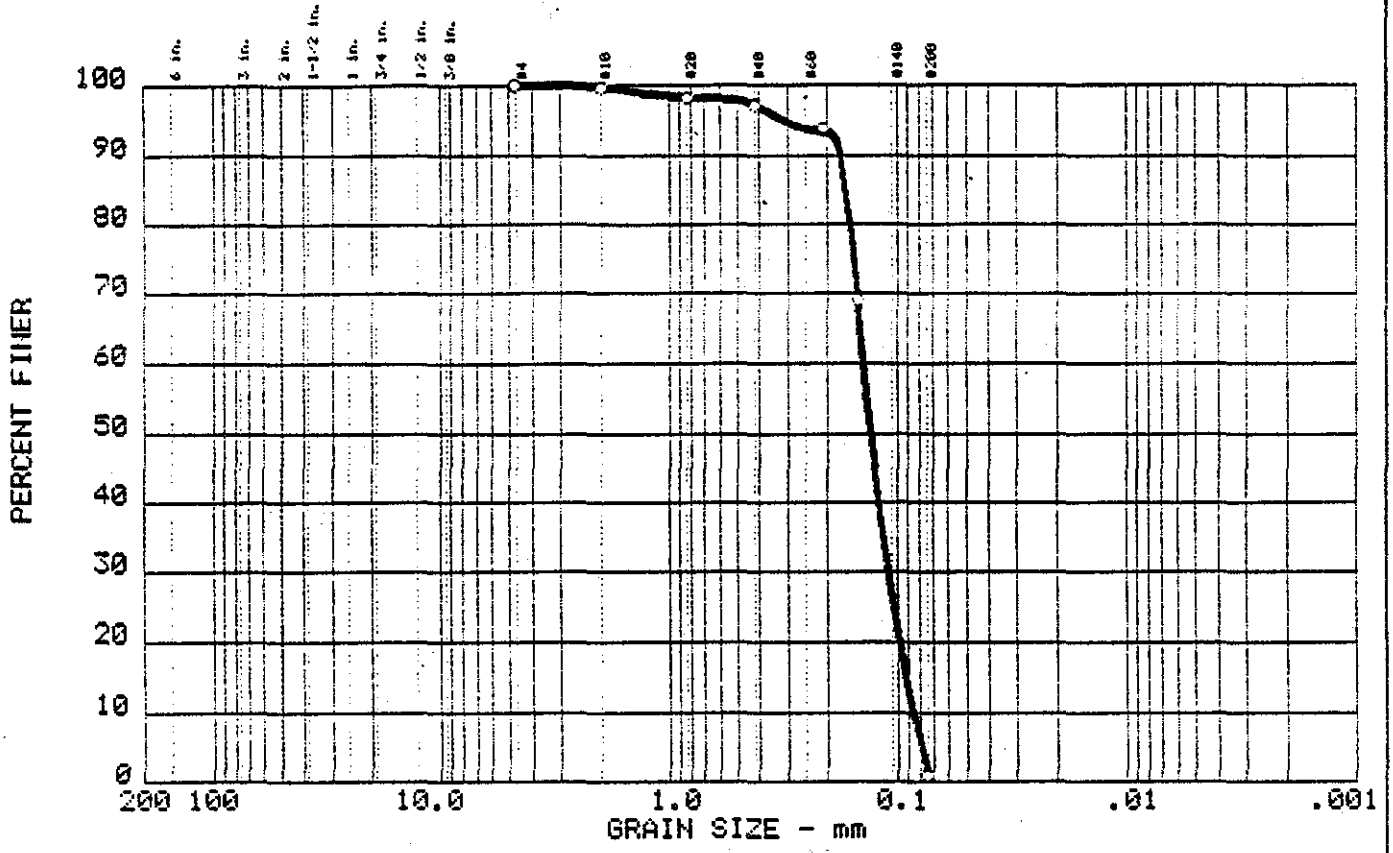
Boring No.: LAB SER 100-370-10

Date: 12/16/83

ENG FORM 1 MAY 63 2087

pH = 7.2

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	0.0	0.0	99.1	0.9	

	LL	PI	D_{75}	D_{60}	D_{50}	D_{30}	D_{25}	D_{10}	C_c	C_u
○			0.15	0.14	0.13	0.110	0.1044	0.0855	1.01	1.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ poorly-graded Sand	SP	

Project No.: 100-469-3
Project: Wood Island
○ Location: S-3

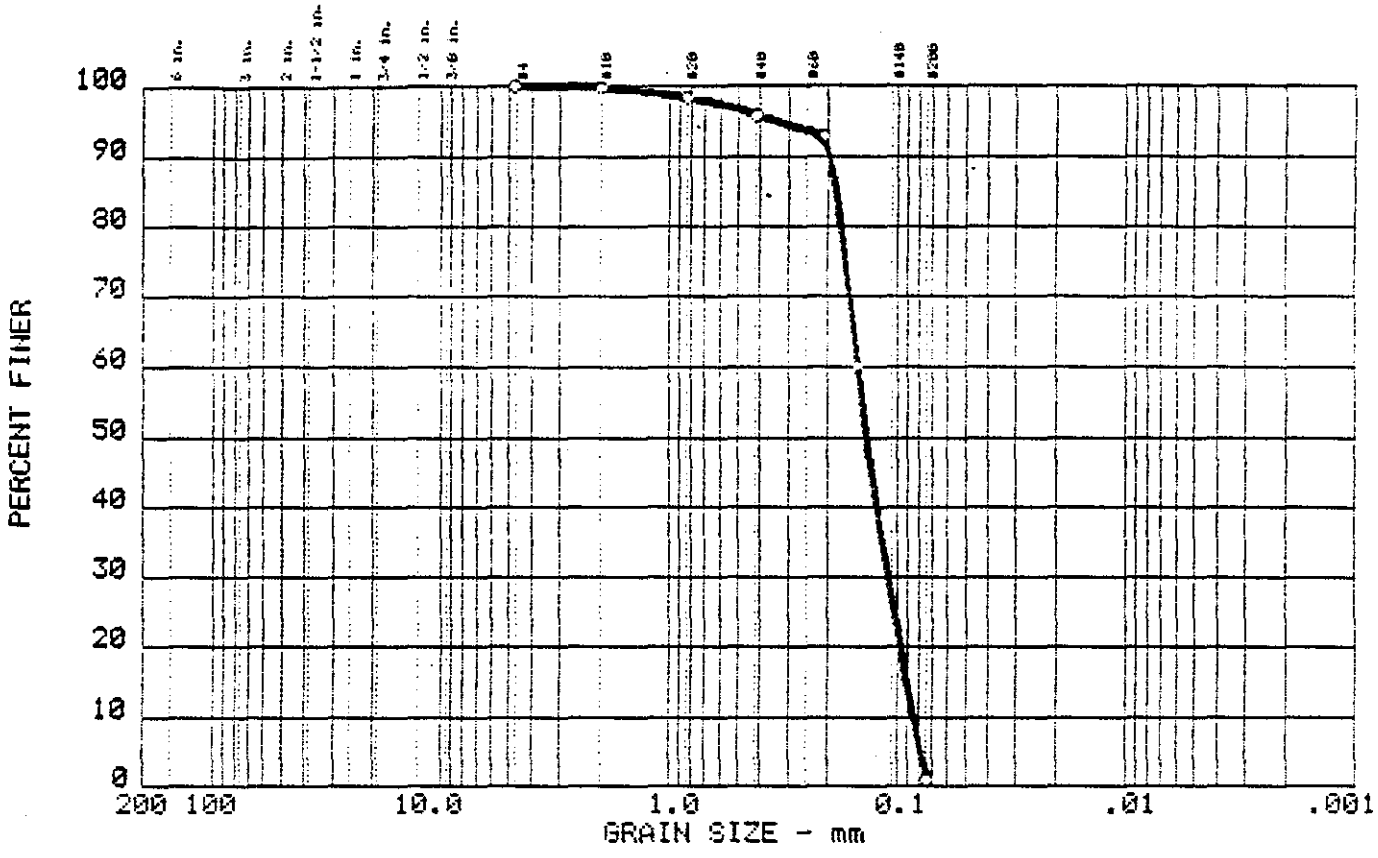
Date: 12-16-87

Remarks:
Gs= 2.65
Shell fragments present

GRAIN SIZE DISTRIBUTION TEST REPORT
CORPS OF ENGINEERS - NEW ENGLAND

Fig. No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
o	2	0.0	0.0	99.1	0.9	

	LL	PI	D_{75}	D_{60}	D_{50}	D_{30}	D_{25}	D_{10}	C_c	C_u
o			0.17	0.15	0.14	0.110	0.1035	0.0844	0.96	1.8

MATERIAL DESCRIPTION	USCS	AASHTO
o poorly-graded Sand	SP	

Project No.: 100-469-2
Project: Wood Island
o Location: S-2

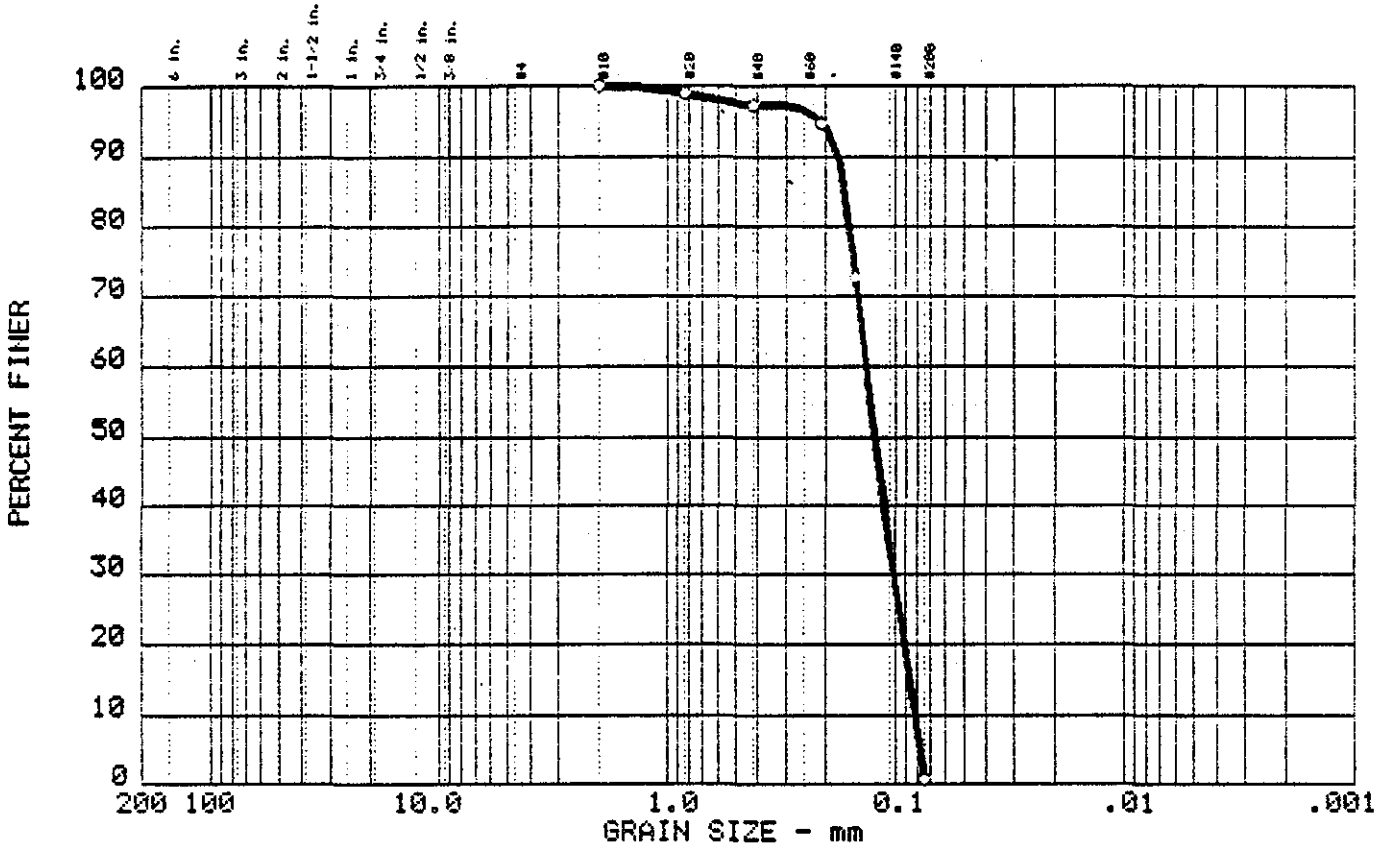
Date: 12-16-87

Remarks:
Gs= 2.67
Shell fragments present

GRAIN SIZE DISTRIBUTION TEST REPORT
CORPS OF ENGINEERS - NEW ENGLAND

Fig. No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	0.0	0.0	99.3	0.7	

	LL	PI	D_{75}	D_{60}	D_{50}	D_{30}	D_{25}	D_{10}	C_c	C_u
○			0.15	0.13	0.12	0.101	0.0961	0.0818	0.93	1.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ poorly-graded Sand	SP	

Project No.: 100-469-1
Project: Wood Island
○ Location: S-1

Date: 12-16-87

Remarks:
Gs= 2.68
Shell fragments present

GRAIN SIZE DISTRIBUTION TEST REPORT
CORPS OF ENGINEERS - NEW ENGLAND

Fig. No. ____

APPENDIX B

DISPOSAL SITE BENTHIC DATA

Table 1

WOOD ISLAND HARBOR, MAINE

Benthic samples were collected from an inter-island sand bar located between Basket Island and Stage Island on 4 August 1988. This data represents the number of species/0.01m2. a=landward side (low water mark) of sandbar, b=center of sandbar, c=seaward side (low water mark) of sandbar, s=subtidal (seaward of sandbar), P=species present.

Species	Transects																							
	1				2				3				4				5				6			
	a	b	c	s	a	b	c	s	a	b	c	s	a	b	c	s	a	b	c	s	a	b	c	s
Phylum MOLLUSCA																								
Class Bivalvia																								
Tellina agilis			1	1	1																			
Macoma calcarea							1																	
Phylum NEMATODA		P	P		P	P	P	P		P	P		P	P			P	P	P	P	P	P	P	P
Phylum ANNELIDA																								
Class Polychaeta																								
Nephtys sp.																				4				
Nereis diversicolor		2			1	5	2	1	1		1		8				1							
Spio filicornis	3	16		8		9	9			1				1								1	9	
Streblospio benedicti																			1					
Scolelepis squamata		2	4					7				5							1	19			9	
Paraonis fulgens	26	28	63	100	6	63	61	68	5	3	22	46	4	1	1	8	9	2	3	65	2	7	10	3
Scoloplos armiger		1	2			3					4	3	5		1	1	1				1			
Class Oligochaeta																								
Oligochaete spp.	1	3	30		1	3	8	25		10	6		70		1			9	4	8	1	3	8	1
Phylum ARTHROPODA																								
Order Isopoda																								
Sphaeroma quadridentatum													1											
Chiridotea sp.																	2				2		1	
Order Amphipoda																								
Ampithoe rubricata						1																	1	
Corophium sp.									1				1					1						
Haustorius canadensis	1		11	9	2		1	9		30	13	1	10	1	4	5	31	12	1	35	14	10	2	5

APPENDIX C

COORDINATION LETTERS

MAINE HISTORIC PRESERVATION COMMISSION
55 Capitol Street
State House Station 65
Augusta, Maine 04333

Earle G. Shettleworth, Jr.
Director

Telephone:
207-289-2133

January 13, 1989

Mr. Joseph L. Ignazio
Planning, New England Division
Army Corps of Engineers
424 Trapelo Road
Waltham, Mass. 02254

Re: Wood Island Harbor Navigation Improvement: Disposal Area

Dear Mr. Ignazio:

My staff has reviewed the information developed by a visit of your staff on November 21 to the disposal site area between Stage Island and Basket Island, Biddeford Pool. This information makes it seem very unlikely that a significant archaeological site will be located in the disposal area.

I find that this project will have no effect upon any structure or site of historic, architectural, or archaeological significance as defined by the National Historic Preservation Act of 1966.

Sincerely,

Earle G. Shettleworth, Jr.
State Historic Preservation Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

Joseph L. Ignazio
Chief, Planning Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

DEC 0 6 1988

Dear Mr. Ignazio:

This letter is in reference to the Basket Island dredge disposal site proposed for the Wood Island Harbor Navigation Improvement Project in Biddeford, Maine. We have reviewed the invertebrate sampling results provided by Cathy Demos and the additional information provided in Colonel Wilson's letter of November 8, 1988. We can now finalize our comments on this alternate disposal site proposed for the navigation improvement study.

The Stage Island resource concerns identified in our September 1, 1988, planning aid letter have been resolved through coordination with Chris Hatfield and Cathy Demos of your staff. The disposal of 11,500 cubic yards of clean sand between Stage Island and Basket Island should not significantly impact fish and wildlife resources provided the mitigative measures identified below are implemented. Following is a summary of our conclusions and the mitigative measures discussed with your staff.

1. Although razor and soft-shelled clams were reported as possibly occurring at the site, benthic invertebrate samples collected throughout the disposal site did not turn up significant shellfish resources. The only shellfish encountered at the site were several Tellina and a single Macoma clam.

2. It does not appear that spoil disposal on the intertidal sand bar between Basket Island and Stage Island will increase wildlife disturbance on Stage Island by facilitating access across the sand bar. Changes in the elevation of the bar are expected to be negligible (several inches, if detectable). Spoil material will be directed towards the Basket Island end of the bar. Material will not be deposited adjacent to Stage Island.

3. The project should not impact the productive tide flats or mussel shoals south of the bar due to the sediment transport patterns in the area and the proposal to dispose of material on the ocean side of the sand bar. Measures will be taken to prevent suspended dredged material from being transported by flood tide currents and deposited on productive near-shore areas. Disposal will be directed towards subtidal and lower intertidal areas on the northern (ocean) side of the bar. Dredged material will not be deposited on the southern (landward) side of the sandbar. Disposal will not occur when tidal currents are conducive to onshore transport. When tide levels are above the elevation of the sandbar, disposal will occur only when the tide is ebbing.

4. To prevent disturbance of wildlife resources on Stage Island, work should be performed during the late fall-early winter period. The hydraulic dredge pipeline should be floated around Stage Island and not pass over the island itself.

We appreciate your efforts to address our fish and wildlife concerns. Please contact Michael Tehan at (603) 225-1411 if you have any additional questions.

Sincerely yours,

Vernon B. Lang
Acting Supervisor
New England Area

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

Lt. Colonel Stanley Murphy
Deputy Division Engineer
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

SEP 0 1 1988

Dear Colonel Murphy:

By letter of July 6, 1988, Joseph Ignazio, Chief, Planning Division, requested our comments on an alternate disposal site proposed for dredged material associated with the Navigation Improvement Study for Wood Island Harbor at Biddeford Pool, Maine. On August 5, 1988, we received from Carl Boutilier, Chief, Navigation Branch, the Environmental Assessment for a new open water disposal site in Saco Bay that would receive material from maintenance dredging of the existing Wood Island Harbor federal navigation project within Biddeford Pool. Since these projects involve different aspects of the same federal navigation project, our comments have been consolidated and are provided below.

Navigation Improvement Study (Section 107)

The proposed project involves establishing a commercial navigation channel from Biddeford Pool to deep water in Wood Island Harbor. Approximately 11,500 cubic yards of sand would be removed from the channel entrance area between Wood Island and Stage Island. The current proposal is to dispose of this material on an intertidal sand bar between Basket Island and Stage Island.

We previously reported on the fish and wildlife resources of the Wood Island Harbor-Biddeford Pool vicinity in our November 24, 1986, planning aid letter. As identified in that letter, one of our primary concerns with the project is the need to identify, map, and avoid eelgrass beds known to occur in the general vicinity of the proposed channel. We also noted the importance of the area to migratory birds for resting and feeding habitat, particularly for shorebirds and raptors. Stage Island, Wood Island and Negro Island have been identified as colonial nesting seabird islands by the Maine Department of Inland Fisheries and Wildlife.

The new disposal site between Basket Island and Stage Island consists of an intertidal sand bar. On August 25, 1988, we inspected the site at a -0.3 tide. As the tide receded, large numbers (several hundred) double-crested cormorants were observed feeding in the shallow waters between Stage and Basket Island. These birds were later seen roosting on the rocky shores of Stage Island. We observed substantial numbers of feeding shorebirds and gulls on the intertidal flats and mussel shoals to the west of the subject sand bar. A pair of northern harriers was seen hunting over Stage Island and the surrounding tide flats. The east (seaward) side of the sand bar was not being used by birds, presumably due to the presence of human activity (beachcombing, all-terrain vehicle use) on beach. The slope of the east side

of the inter-island bar was steeper than the west, and consisted of sand with scattered sand dollars and clumps of unattached algae. Several razor clam shells were present on the surface of the sand, however, no mussels or soft-shelled clam shells were seen. We did not sample for shellfish or other invertebrates.

The Maine Department of Marine Resources reports that razor clams and soft-shell clams may be present at the proposed Basket Island-Stage Island disposal site. We have not yet reviewed the results of benthic invertebrate sampling performed by New England Division staff on August 4, 1988, because the samples are still being processed. However, in describing her observations during the sampling effort, Ms. Cathy Demos of your staff indicated that she did not recall shellfish being visibly present in the benthic samples collected at the site.

One concern we have with disposing of dredged material on the inter-island sand bar is that it may facilitate human access to Stage Island and its surrounding tide flats, resulting in disruption of wildlife feeding and resting activities. Stage Island and its environs are particularly important to shorebirds and seabirds because it is isolated by shallow water from the human disturbance associated with the inhabited Basket Island at all but extreme low tides. By raising the elevation of the bar with spoil material, it may become exposed more frequently, and thus make it easier for people and possibly all-terrain vehicles to access Stage Island. To evaluate the potential for increased wildlife disturbance, we would like to review more specific information regarding the expected physical changes associated with spoil disposal on the bar.

We are also concerned with the potential for impacts to intertidal habitat conditions on the flats behind the inter-island sand bar that may occur if changes in the bar elevation alter tidal flushing or sediment deposition patterns. This problem may be particularly serious if the site is used repeatedly for spoil disposal and the bar is raised above the intertidal elevation over time.

Disturbance of wildlife resources in the vicinity of Stage Island during dredge disposal is also of concern. We previously recommended that any work be accomplished during the late fall-early winter period to minimize disturbance to fish and wildlife resources. In addition to time restrictions, we would like to review additional information regarding the siting of equipment at both the dredge and disposal sites to evaluate their proximity to bird feeding and roosting sites.

Before finalizing our final investigations and recommendations regarding the designation of this site for dredge material disposal, we would like to see additional information developed to address the concerns identified above. We would also like the opportunity to review the findings of the Corps benthic studies from the site as soon as they become available.

Given the significant marine and wildlife resources in the vicinity of the proposed disposal site, it may be appropriate to seek an alternate disposal option that would utilize the clean, sandy spoil material for a beneficial purpose. One beneficial use of this material in the Saco Bay area would be for the nourishment of beaches that are experiencing significant erosion. We suggest you contact the various natural resource agencies in Maine to determine if suitable candidates for beach nourishment projects exist in the Saco Bay area.

Wood Island Harbor Maintenance Dredging

We continue to be concerned with the New England Division's piecemeal approach to dredge disposal planning in the Saco Bay area. As a result of the Corps' independent planning activities, two new disposal sites are being proposed simultaneously for different aspects of the Wood Island Harbor Federal navigation project. The environmental assessment addresses only impacts associated with maintenance dredging and is based on the assumption that the new Saco Bay disposal site would not receive material from any other authorized project. No mention was made of the need to find a disposal site for material associated with the Wood Island Harbor navigation improvement project.

The environmental assessment defers consideration of cumulative or indirect impacts of other dredge disposal projects in the area, despite our recommendation to address these concerns early in the planning process. There is acknowledgment in the assessment that two local entities (Biddeford Pool Yacht Club and the Fisherman's Association) have expressed interest in disposing of material from their maintenance dredging at the new Saco Bay disposal site. The impacts of these related activities are not discussed in the environmental assessment.

We are concerned with the possibility that sediments at the two other dredge sites may be finer in texture and subject to different input sources and thus may contain higher levels of contaminants, such as PCB's, than the material from the federal navigation basin. We cannot evaluate the potential hazard to fish and wildlife resources from disposal of this material in Saco Bay since these sites were not included in the Corps' bulk sediment analyses for Biddeford Pool.

The Council on Environmental Quality's regulations pursuant to the National Environmental Policy Act call for assessments of project impacts to include both direct and indirect effects. Indirect effects are those that are caused by the action (in this case establishing a new disposal site) and, although occur later in time, are still reasonably foreseeable. Cumulative impacts are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency, (Federal of non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 C.F.R. Sec. 1508.7-1508.9)

We believe that a more comprehensive approach to dredge disposal planning is essential to avoid seemingly minor impacts from individual projects or project segments that may prove to be significant when considered collectively over time. We therefore recommend that the environmental assessment include a discussion of all dredging and disposal activities (both Federal and non-Federal) expected in the Saco Bay vicinity in the reasonably foreseeable future. For example, will the Saco River, Scarborough River, or other Federal navigation projects in the area require maintenance dredging in the near future, and if so, what type of material would be generated and where would it go? If there are indeed no alternatives to dredge disposal in the area except for off-shore disposal at the new Saco Bay site, (a conclusion reached in the assessment), it seems counter-intuitive to also conclude that no other projects would use the Saco Bay disposal site in the future.

We appreciate the opportunity to provide these planning aid comments for your consideration. Please contact Michael Tehan of my staff at 603-225-1411 if you have any additional questions.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Area

CC: RO/FWE Reading File
Chris Mantzaris, NMFS, Gloucester
Pam Shields, EPA, Boston
Brad Sterl, ME DMR, Ogunquit
Bill Laflamme, ME DEP, Augusta
Steve Timpano, ME IFW, Augusta
FWE: MTehan:8-31-88:834-4411

STATE OF MAINE
EXECUTIVE DEPARTMENT
STATE PLANNING OFFICE

JOHN R. McKERNAN, JR.
GOVERNOR

RICHARD H. SILKMAN
DIRECTOR

June 6, 1988

Joseph L. Ignazio
Chief, Planning Div.
New England Div., Corps of Engineers
424 Trapelo Road
Waltham, Mass. 02254-9149

Dear Mr. Ignazio,

With reference to your letter of April 18, 1988, I have obtained comments from State agencies to the effect that your proposed Basket Island disposal site for the Wood Island Harbor-Biddeford Pool entrance channel project is acceptable.

A memo on the proposal from the Maine Geological Survey is attached. Please note their request that the post-disposal pattern and rate of spoils dispersal be addressed in the environmental assessment.

The DMR commented that the Basket Island site is o.k., although they would prefer disposal at Ferry Beach where the sand is needed. They also commented that they object to disposal at the Hills Beach site proposed earlier due to existence of soft shell clam habitat in the intertidal area. The DEP had no comments beyond those of the DMR. The Bureau of Public Lands found the project acceptable; the Dept. of Transportation and the Southern Maine Regional Planning Commission had no comments.

Thank you for the opportunity to comment.

Sincerely,

Robert G. Blakesley
Acting NED Coordinator

cc: Laflamme, Sterl, Dickson, Elder
biddefor.14

184 STATE STREET, STATE HOUSE STATION 38, AUGUSTA, MAINE 04333 TEL. (207) 289-3261 or 3154

STATE OF MAINE

Inter-Departmental Memorandum Date 5/26/88

To Bob Blakesley Dept. State Planning Office

From Steve Dickson Dept. Maine Geological Survey

Subject Wood Island Harbor - Biddeford Pool entrance channel project

In response to your 4 May 1988 request for comments on the Corps of Engineers plans to site dredge spoils between Basket and Stage Islands as described in a letter by Mr. Joseph Ignazio on 18 April 1988, the Maine Geological Survey has the following assessment.

The site chosen, described in the letter as an inter-island bar, is the most suitable location for the dredge spoils. This site is very similar geologically to the one planned for dredging so the sediments and physical processes are quite similar at both locations. The Stage Island tombolo between the area to be dredged and the disposal site should be an adequate barrier to prevent the rapid return of sands to the entrance channel.

The Corps of Engineers should address the anticipated (post-disposal) pattern and rate of spoils dispersal in their Environmental Assessment.

cc: Joe Kelley, MGS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. BOX 1518
CONCORD, NEW HAMPSHIRE 03301

Joseph L. Ignazio
Chief, Planning Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

MAR 1 - 1987

Dear Mr. Ignazio:

This responds to your February 26, 1987 request for information on the presence of Federally listed and proposed endangered or threatened species within the impact area of a Section 14 - Emergency Shoreline Protection Project, at Surf Street, in Saco, Maine.

Our review shows that except for occasional transient individuals, no Federally listed or proposed threatened and endangered species under our jurisdiction are known to exist in the project impact area. However, we suggest you contact the Maine Department of Marine Resources. No Biological Assessment or further consultation is required with us under Section 7 of the Endangered Species Act. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

We do not anticipate any adverse impacts to marine resources as a result of this project. Winter storms have accelerated the erosion of Ferry Beach and it is apparent that disposal of sand and other suitable material is necessary to temporarily combat the erosion problem. We suggest that the Corps place the sandy dredge material from Wood Island Harbor onto Ferry Beach. This would be an excellent use of the Harbor material.

A list of Federally designated endangered and threatened species in Maine is inclosed for your information. Please contact us if we can be of further assistance.

Sincerely yours,

Gordon E Beckett

Inclosure

Gordon E. Beckett
Supervisor
New England Area

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. BOX 1518
CONCORD, NEW HAMPSHIRE 03301

FEB 5 1987

Joseph L. Ignazio
Chief, Planning Division
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Dear Mr. Ignazio:

This responds to your January 27, 1937 request for information on the presence of Federally listed and proposed endangered and threatened species within the impact area of a Section 107, Navigation Improvement Project at Wood Island Harbor in Biddeford, Maine.

Except for occasional transient individuals, no Federally listed or proposed threatened or endangered species under our jurisdiction are known to reside in the project impact area. Ron Joseph of my staff observed an adult peregrine falcon chasing semipalmated plovers during his field review of the project site on August 17, 1986. Hills Beach is an important resting and feeding area for migratory shorebirds. No Federally threatened piping plovers were seen, but the species probably uses the beach as a resting and feeding area. Numerous sanderlings, semipalmated plovers, semipalmated sandpipers, black-bellied plovers, greater yellowlegs and ruddy turnstones were observed in mid-August.

You may wish to contact the Maine Department of Inland Fish and Wildlife and the Maine Critical Areas Program for information on state listed species and critical areas. No Biological Assessment or further consultation is required with us under Section 7 of the Endangered Species Act. Should project plans change or if additional information on listed or proposed species becomes available, this determination may be reconsidered. We encourage you to pursue enhancing shorebird habitat on Hills Beach with the clean sandy dredge material.

A list of Federally designated endangered and threatened species in Maine is enclosed for your information. Thank you for your cooperation and please contact us if we can be of further assistance.

Sincerely yours,

Vernon B. Lang
Acting Supervisor
New England Area

Enclosure

CC: RO/FWE Reading File
MF&W - S. Timpano
Maine Critical Areas Program - H. Tyler
ES: RJoseph:gl:2-3-87:334-4411

UNITED STATES D. ARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Management Division
Habitat Conservation Branch
2 State Fish Pier
Gloucester, MA 01930-3097

January 29, 1987 F/NER74:DB

Joseph L. Ignazio
Chief, Planning Division
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Dear Mr. Ignazio:

This is in response to our letter of January 27, 1987, regarding the presence of endangered or threatened species under the jurisdiction of the National Marine Fisheries Service at Wood Island Harbor, in Biddeford Pool, Maine. There are no marine endangered or threatened species found near the proposed Navigation Improvement Project site. Therefore, there is no need for further consultation pursuant to Section 7 of the Endangered Act of 1973, as amended. Should project plans change or new information become available that changes the basis for this determination, then consultation should be reinitiated.

Sincerely,

Douglas W. Beach

Douglas W. Beach
Wildlife Biologist

MAINE AUDUBON SOCIETY

Gilsland Farm • 118 Old Route One • Falmouth, Maine 04105 • 781-2330

December 23, 1986

Joseph L. Ignazio
Chief, Planning Division
New England Division Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02254

Re: Wood Island Harbor Project Study

Dear Mr. Ignazio:

Thank you for the opportunity to comment on your project study early in the process. The following are our concerns regarding the proposal:

1. Please send us additional information to aid us in our review. What is the project's purpose and who requested it? Is the only area proposed for dredging the "hatched" area on the map between Stage and Wood Islands, or is dredging proposed from the entrance to Biddeford Pool along a channel between Stage and Wood Islands? What are the size and number of boats currently using and projected to use the Harbor? When was the Harbor and channel last dredged? How soon do you project that dredging will be necessary again after this dredging?

2. We request that the dredged material be tested for contamination.

3. We request that the geomorphology of the dredged area and the Hills Beach area be analyzed. What are the downshore impacts of the dredging and the placement of dredged sand on the beach? Is there sufficient evidence that the sand will stay at Hills Beach? What is the present current pattern in the area? Will the dredging affect currents and scouring of the Pool?

4. How will the dredging impact the Biddeford Pool mudflats which are very important feeding areas for migratory as well as resident birds during the period from April through October? What time of the year will the dredging take place? If you plan to dredge in the Pool, the best time would be mid-winter as long as any impact on wintering birds is minimized. If all dredging is outside the Pool, then after mid-August in the fall may also be appropriate.

If you need additional information on birds that use the Biddeford Pool area, Jane Arbuckle, Wildlife Director at Maine Audubon, may be able to assist you.

We would appreciate the opportunity to comment on the draft of the Detailed Project Report/Environmental Assessment when it is prepared.

Sincerely,

Nancy C. Anderson

Nancy C. Anderson
Attorney/Advocate

cc Kenneth Fink
Joseph Kelley
Susan Woodward

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Rachel Carson National Wildlife Refuge
RR 2, Box 751, Route 9 East
Wells, Maine 04090

December 9, 1986

Ms. Sue Woodward
Maine Department of Inland
Fisheries and Wildlife
P.O. Box 1298
Bangor, Maine 04401

Dear Sue,

After reviewing the preliminary navigation improvement project that will involve dredging a sandy shoal between Stage Island and Wood Island we are providing you with the following comments.

The proposed dredging, 125' wide by 10' deep by 312' long, is not a large project. Short-term impacts may involve some local shifting of waterfowl populations. Stage Island, Negro Island, and Wood Island do not contain any nesting seabird species of concern. Only herring and great black-backed gulls have nested on these islands in the past few years. Wood Island has contained large numbers of nesting waders (Erwine et.al. 1977) in the past but has been overrun by large gulls (Maine Audubon Society personal communication 1986).

The piping plover, a threatened species in the northeast, historically nested in the Biddeford Pool area (Dorr 1976). Pipers have also successfully nested on dredge spoil areas in southern Maine. This occurred in the spoil site created when Wells Harbor was dredged. In 1976, Dorr (1976) reported 4-6 nesting pairs in this area. The possibility of creating a suitable plover and least tern nesting site exists and should be further investigated. The benefits of doing so may outweigh the loss of a small piece of shellfish bed. Information needed to justify this project include: possible sites for the spoil (an island situation is preferred to decrease mammalian predation opportunities); extent of the current shell fishery in the area and its'

economic value; and input from Maine Audubon Society and the Piping Plover Recovery Team.

If this project appears feasible, a good publicity campaign prior to public hearings may prove invaluable. Please keep our office abreast of this project and feel free to call for further assistance.

Take Care,

John Lortie
Biological Technician
Rachel Carson NWR

JL/cf

Dorr, D.K. 1976. Piping Plover, Charadrius melodus, nesting habitat in Maine and its relevance to the Critical Areas Program. Planning Report Number 15. Maine Critical Areas Program, State Planning Office.

Erwin, R.M. and C.E. Korschgen. 1979. Coastal waterbird colonies: Maine to Virginia, 1977. An atlas showing colony locations and species composition. U.S. Fish and Wildlife Service, Biological Services Program, FWS/OBS-79/08.

MAINE HISTORIC PRESERVATION COMMISSION
55 Capitol Street
Augusta, Maine 04333

Earle G. Shettleworth, Jr.
Director

Telephone:
207-289-2133

December 8, 1986

Mr. Joseph L. Ignazio, Chief
Planning Division
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

Dear Mr. Ignazio:

Thank you for your letter of November 24th concerning proposed navigation improvements to Wood Island Harbor at Biddeford Pool, Maine. As you note, my letter of June 12, 1984 expressed concerns that dredging in connection with this project might have a negative impact upon shipwreck sites, documented or undocumented.

With regard to documented shipwreck sites, the Commission's Historic Archaeological Inventory contains the following:

ME 041-03 "FLEETWING" (1891), Biddeford Pool vicinity
ME 041-04 "ANAHUAC" (1923), Fortunes Rocks vicinity
ME 041-05 "GEORGE & ALBERT" (1887), Wood Island vicinity
ME 041-06 "MARSHALL PERRIN" (1907), Wood Island vicinity
ME 041-07 "FRED TYLER" (1920), Biddeford Pool vicinity
ME 041-08 "ROGER DRURY" (1918), Biddeford Pool vicinity

Given the early importance of Biddeford Pool and Wood Island Harbor as anchorages dating from at least the 1630s, there is the distinct possibility that undocumented colonial-era shipwrecks are also in the area.

Therefore, I feel that prior to any dredging activities a remote-sensing survey of the project area by professionals in underwater arcaheology should be undertaken, followed up as necessary by diving on selected target anomalies and determination of National Register eligibility should sites be present.

The underwater topography of the area to be dredged includes a rapid drop in ocean floor depth from approximately 10 feet to 27 feet depth. This topographic configuration is likely to have been a beach connecting Stage, Negro and Wood Island, at some time between circa 7,000 and circa 3,000 years ago,

MAINE HISTORIC PRESERVATION COMMISSION
55 Capitol Street
State House Station 65
Augusta, Maine 04333

based on our understanding of land subsidence and sea level curves for the Maine coast. The area should be carefully explored by sub-bottom profiling and coring in a search for submerged land-surfaces on peat deposits from the time period. Such deposits have been demonstrated to contain significant prehistoric archaeological sites along the Maine coast.

If you should have further questions concerning this matter, please do not hesitate to contact me, Dr. Robert L. Bradley, or Dr. Arthur Spiess of my staff.

Sincerely,

Earle G. Shettleworth, Jr.
State Historic Preservation Officer

cc: Dr. Robert L. Bradley
Dr. Arthur E. Spiess

EGS/slm

STATE OF MAINE
Department of Environmental Protection

MAIN OFFICE: RAY BUILDING, HOSPITAL STREET, AUGUSTA
MAIL ADDRESS: State House Station 17, Augusta, 04333

JOSEPH E. BRENNAN
GOVERNOR

KENNETH C. YOUNG, JR.
COMMISSIONER

December 5, 1986

Joseph L. Ignazio
Chief, Planning Division
Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

RE: Proposed Navigation Improvements
to Wood Island Harbor Biddeford Pool, Maine

Dear Sir:

I am writing in response to your letter of October 30, 1986 addressed to Commissioner Kenneth Young,a copy of which was provided to me. As Federal Consistency Coordinator for the Department I am responsible for reviewing federal projects such as the one proposed.

As I understand it you are currently considering the dredging of a 125 foot wide by 10 foot deep channel which would involve the removal of approximately 14,500 cubic yards of material. You are also considering three other alternatives involving dredging channels of smaller dimensions .

Chapter 344 of the Alterations of Coastal Wetlands Act, one of the "core" laws of Maine's Coastal Zone Plan, indicates that any alteration "shall be no greater in size than length, width and height necessary to accomplish its intended function". Therefore I would recommend that alternative #3 which involves a 100 foot wide 8 foot deep channel be considered instead of the current proposal if in fact it would accomplish the intended function.

I would also consider the use of dredge spoils for beach nourishment of nearby Hills Beach as the most favorable disposal alternative.

In order to obtain further biological and geological information about the area which is proposed for dredging I would suggest that you contact Brad Sterl a Marine Biologist with the Maine Department of Marine Resources at 207-646-3322 and Joseph Kelley a Geologist with the Maine Geological Survey at 207-289-2801.

I appreciate the opportunity to be able to comment on the project in its planning stages and look forward to working with you when the project is eventually submitted for a consistency determination review.

Sincerely,

William N Laflamme

WILLIAM N. LAFLAMME
Division of Licensing & Review
Bureau of Land Quality Control

WNL/jw

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. BOX 1518
CONCORD, NEW HAMPSHIRE 03301

Joseph L. Ignazio
Chief, Planning Division
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

NOV 24 1986

Dear Mr. Ignazio:

This Planning Aid Letter regarding the navigation improvement study at Wood Island Harbor-Biddeford Pool near Biddeford, Maine is intended to provide you with information on the natural resources of the area which need to be considered during your planning process. It has been prepared under the authority of the Fish and Wildlife Coordination Act/48 Stat. 401, as amended; 16 U.S.C., 661 et seq.).

The proposed project involves establishing a commercial navigation channel from Biddeford Pool to deep water in Wood Island Harbor. Approximately 14,500 cubic yards of sand would be removed from an area 125 feet wide by 10 feet deep between Stage Island and Wood Island. A hydraulic dredge would be used to pump the medium to fine sand onto nearby Hills Beach.

There are a number of important marine resources that need to be addressed during the planning process. Our August 13, 1986 field review of the proposed disposal site revealed small to moderate populations of uneven age clams including mya, macoma and tellina. Small populations of blue mussels also occur in the sparse rocky intertidal areas of Hills Beach. According to the Maine Department of Marine Resources, the natural channel contains unknown quantities of quahogs and surf clams which in all likelihood will be impacted by your dredging operations. To determine the density and diversity of the shellfish populations, additional surveys need to be initiated prior to dredging of the channel. The Corps should also determine the extent of eel grass in the channel since eelgrass is growing on the periphery of the channel. Even at low tide, we were unable to evaluate the distribution of eelgrass beds between Stage Island and Wood Island. The beds need to be identified, mapped and avoided since the proposed channel widening has the potential to impact this resource. In accordance with the Fish and Wildlife Service's Mitigation Policy, we consider these eelgrass beds to be resource category 2 habitat because of their high ecological value, biological productivity and relative scarcity.

The Hills Beach area is an important migratory resting and feeding area for numerous shorebirds and raptors. Shorebirds seen during our field trip included sanderlings, semipalmated plovers, black-bellied plovers, semipalmated sandpipers, greater yellowlegs and ruddy turnstones. An adult peregrine falcon was observed chasing plovers over the mudflats near Stage Island. Other birds in the area include herring gulls, black-backed gulls, ring-billed gulls, common terns, arctic terns, black-crowned night herons,

common eiders, and double-crested cormorants. Bluefish, striped bass, winter flounder, mackerel, and menhaden constitute the bulk of the fisheries in the area during the spring/summer months. A small Atlantic salmon run occurred this year in the Saco River. Sixteen adult fish were live trapped and released upstream above several dams on the river and two fish were taken by rod and reel. According to the Maine Department of Marine Resources, intensive salmon restoration work may be undertaken in the Saco River after the fishways are improved for anadromous fish runs. The river supports a small alewife run and probably a small shad run as well.

Based on existing information, we do not anticipate significant resource problems provided the eelgrass beds are avoided and the 15,000 cubic yards of coarse sand is distributed evenly above the mean high water mark on Hills Beach. We prefer a late fall-early winter work schedule to avoid turbidity problems which may impact the July-August shellfish spawning season, avian use of the area and the sports fishery.

Please contact Ron Joseph of my staff at FTS 834-4411 if you have any questions.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Area

CC: RO/FWE Reading File
MDMR, Brad Sterl, Ogunquit
NMFS, Sue Mello
EPA, E. Higgins
NED, Joe Horowitz
ES: RJoseph:jd:11-24-86:834-4411

STATE OF MAINE
DEPARTMENT OF CONSERVATION
STATE HOUSE STATION 22
AUGUSTA, MAINE 04333

JOSEPH E. BRENNAN
GOVERNOR

RICHARD B. ANDERSON
COMMISSIONER

November 18, 1986

Mr. Joseph L. Ignazio
Chief, Planning Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

Dear Mr. Ignazio:

Regarding your letter of October 30, 1986 in which you asked for information pertaining to future dredging activities near Biddeford Pool, Maine:

1) We have collected hundreds of kilometers of high resolution seismic profiles and side scan sonar data from Saco Bay, much of it near Biddeford Pool (see enclosure).

2) In conjunction with the geophysical data, we have examined cores collected by the Army from the region and have collected numerous bottom samples in the vicinity of the proposed dredging (see enclosure).

3) It is my opinion that glaciomarine mud exists in the shallow subsurface as well as on the seafloor of the area proposed for dredging. This is obviously not suitable for beach nourishment and should be avoided, if possible, during dredging.

4) At your request I will be pleased to discuss the exact location of the dredging with reference to the subsurface geology. I will need to see more precise location information (LORAN coordinates) for the dredging operation before I can relate it to my work.

Thank you very much for your letter of information.

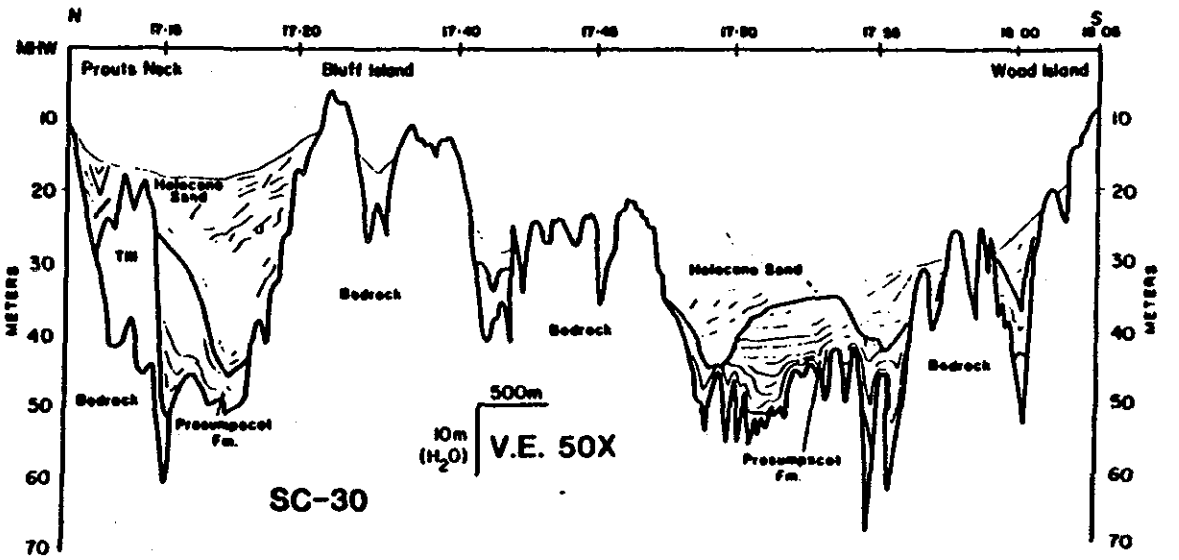
Sincerely,

Joseph T. Kelley

Dr. Joseph T. Kelley
Director of Marine Geology

/cs

cc: Walter Anderson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MHW
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Presumpscot Fm.
METERS
500m
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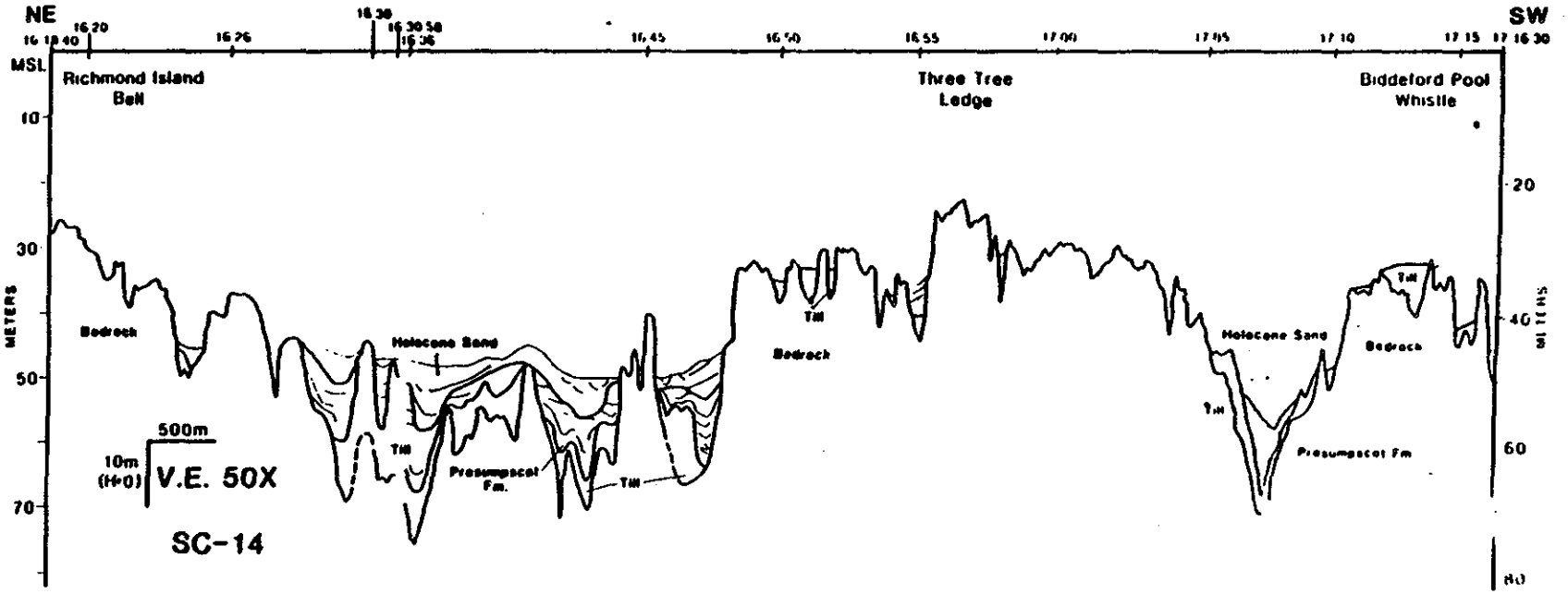
V.E. 50X
SC-30


NE
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Three Tree Ledge
Biddeford Pool Whistle
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Holocene Sand
Till
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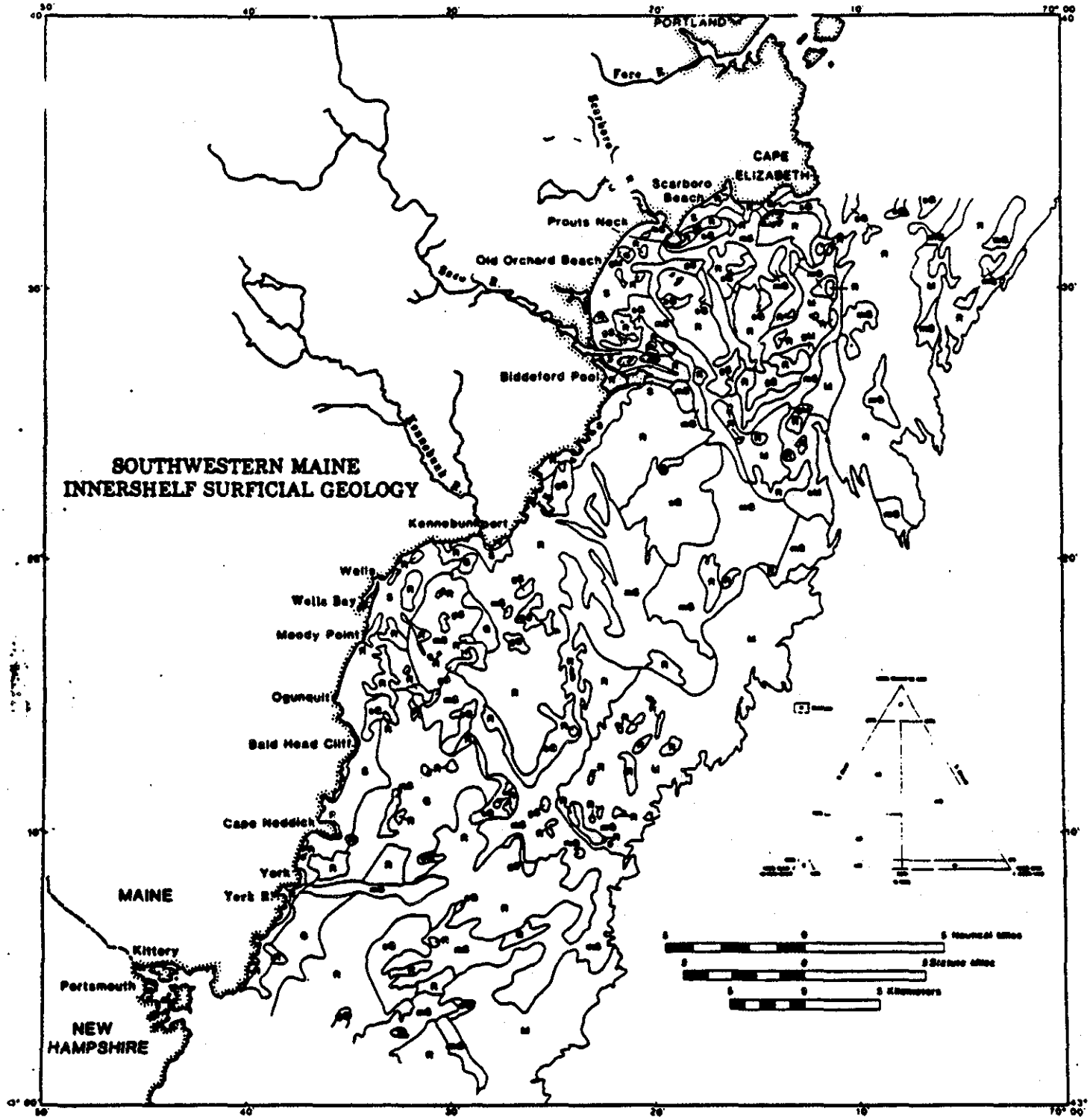
V.E. 50X
SC-14


SOUTHWESTERN MAINE
INNERSHELF SURFICIAL GEOLOGY
PORTLAND
Fore R.
Saco R.
CAPE ELIZABETH
Scarboro Beach
Prouts Neck
Old Orchard Beach
Biddeford Pool
Kennebunkport
Wells
Wells Bay
Moody Point
Ogunquit
Bald Head Cliff
Cape Neddick
York
York R.
MAINE
Kittery
Portsmouth
NEW HAMPSHIRE
5 Nautical miles
5 Statute miles
5 Kilometers

DEPARTMENT OF
INLAND FISHERIES AND WILDLIFE
284 STATE STREET
STATE HOUSE STATION 41
AUGUSTA, MAINE 04333

GLENN H. MANUEL
COMMISSIONER

NORMAN E. TRASK
DEPUTY COMMISSIONER

Endangered & Nongame Wildlife Project
Wildlife Division
P. O. Box 1298
Bangor, ME 04401

November 17, 1986

Joseph L. Ignazio
Chief, Planning Div.
Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

Dear Mr. Ignazio:

I recently received your proposal and request for comments regarding navigation improvement activities in Biddeford Pool, Maine.

The Pool is important at the State level as a migration staging and stopover site for shorebirds and waterfowl. Any activities within the pool which would substantially alter the benthic invertebrate community will degrade the site's value to these birds. The proposed dredging activities, however, should not incur negative effects unless there were a substantial escalation in boating traffic and the attendant discharge of fuel into the Pool.

Regarding disposal of the dredged material, I would like to propose an alternative to dumping it at Higgin's Beach. If technically feasible, and if potential conflicts with the clam fishery can be resolved, the creation of a small dredge spoil island could greatly enhance the value of the area for certain marine birds.

Least terns, piping plovers, and possibly roseate terns would benefit from the availability of suitable nesting habitat provided by a small sparsely vegetated sandy island. All three of these birds are on the State and Federal lists of endangered and threatened wildlife primarily as the result of loss of habitat. Remaining nesting sites for the least tern and piping plover in Maine are rapidly disappearing due to competition with humans for undisturbed areas on sand beaches.

The Army Corps certainly has had extensive experience with construction and maintenance of dredge spoil islands in other parts of the country, and I would defer to your opinioin regarding the feasibility of such a project in Biddeford Pool. If possible, it would be a nice opportunity to demonstrate a positive approach to multiple use management of this unique ecological area.

I would appreciate your comments on the proposal of a dredge-spoil island.

Sincerely,

Susan Woodward

Susan Woodward, Ass't Leader
Endangered and Nongame Wildlife Project

SW:gg

APPENDIX 2

ENGINEERING INVESTIGATIONS, DESIGN AND COST ESTIMATES

APPENDIX 2

ENGINEERING INVESTIGATIONS, DESIGN AND COST ESTIMATES

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ENGINEERING AND INVESTIGATIONS
DESIGN AND COST ESTIMATES

INTRODUCTION

This appendix contains two sections. Section A outlines the various field activities and investigations conducted during the course of the detailed study. Section B provides a detailed engineering analysis of the various alternative Federal plans based on those investigations described in Section A.

SECTION A

ENGINEERING INVESTIGATIONS

DESCRIPTION OF PROJECT AREA

The Wood Island Harbor project is in Biddeford, Maine between Biddeford Pool and Wood Island, about one and one half miles south from the mouth of the Saco River. Biddeford Pool is a rock-controlled protrusion that is connected to the mainland by Fletcher's Neck, a 1-mile long southwesterly barrier beach. "The Pool" is formed in the area between Hills Beach extension in the north, reaching almost to Biddeford Pool, and Fletcher's Neck. The Biddeford Pool landmass is rock with a thin cover of glacial till. The rocks consist of hard metamorphic types, gneiss and hornfels, belonging to the Berwick Formation. Elevation reaches about 43 feet m.s.l. Wood Island is located about one half mile to the north of Biddeford Pool. The island is also a protruding rock mass with a thin cover of glacial drift. There are smaller islands and exposed rock in and around Wood Island Harbor.

The project begins at the mouth of "The Pool" and extends approximately 4,200 feet out into Wood Island Harbor. The bottom materials within the limits of proposed channel dredging are considered to be reworked sands and silts typical of a New England submerged shoreline. There is no evidence that rock will be encountered at project depths.

FIELD INVESTIGATIONS

Field investigations were conducted during the detailed study to determine the ground bottom elevation, type and composition of substrate, and other physical characteristics which would effect plan formulation. This work included hydrographic surveys and sediment analysis. The base data obtained from these field investigations were used to develop and evaluate alternative plans of improvement.

HYDROGRAPHIC SURVEYS

The most recent hydrographic condition survey of Wood Island Harbor and the Biddeford Pool was conducted in January 1987 by the U.S. Army Corps of Engineers. A condition survey was also conducted in November 1983 by Tibbetts Engineering Corporation. The results of these two surveys are shown in Figures 2-1A and 2-1B respectively.

SUBSURFACE INVESTIGATIONS

One drive sample boring was done in November 1987 to determine the characteristics and distribution of the bottom sediment and to determine if there was any underlying peat or ledge located within the proposed dredging area. Exploration depth was based on the anticipated recommended dredge depth of -10 feet M.L.W. The boring was driven to a depth of -11 feet M.L.W. to account for dredging overdepth. A 140 pound hammer, dropped 30 inches, advanced a 2 and 3 inch O.D. split spoon and solid spoon samplers to the required depth with no refusal. Due to the sandy nature of the

material encountered, no samples were retained in either sampler. A diver was then used to collect the sample of bottom material. Sample information is summarized in Table 2-1 and the field log is shown in Figure 2-2A and 2-2B. The location of the boring is shown in Figure 2-3.

NATURE OF THE MATERIAL TO BE REMOVED

In order to determine the nature of the material to be removed under each plan, sediment samples were obtained from various locations in the project area and visually classified using the Unified Classification System. Chemical analysis was performed on some of the samples. The results of the physical and chemical testing revealed that the material in the Biddeford Pool to be fine and silty sand. Due to the sediment containing high levels of certain elements and a high percenage of fines, a suitable disposal site was not available at the time and the Biddeford Pool improvements were dropped from the scope of study. However, the results of this testing have been included in the report. The material in Wood Island Harbor was found to be entirely sand; uncontaminated and suitable for the proposed disposal methods.

Sediment Analysis

Samples were taken from 10 sites (A-J) in August 1983 in conjunction with the environmental sampling program. Samples B through G were taken as sediment cores. Samples A, H, I, and J were taken using grab sampling devices. Physical tests consisting of mechanical seive, specific gravity and percent fines were conducted on all samples with the exception of G and I. In addition, bulk chemistry was performed on samples B, C, D, E, F, H, I and J. Elutriate testing was also performed on samples C and E. The locations of the 10 sediment sample sites are shown in Figure 2-3. The results of the tests on the 1983 samples are shown in Tables 2-2, 2-3 and 2-4. Grain size distribution curves developed from mechanical analysis are shown in Figures 2-4A through J.

As part of the study, samples were taken from Hills Beach and the inter-island sand bar between Basket Island and Stage Island in 1985 and 1988 respectively. These samples were taken in order to determine if the material composing these potential disposal sites was consistent with the dredged material. For environmental reasons, Hills Beach was eliminated as a disposal site option. However, grain size distribution curves developed from the physical analysis of these samples have been included in the report and are shown in Figures 2-5A through L. Physical test results for samples taken from the inter-island sand bar between Basket Island and Stage Island are summarized in Table 2-5. Grain size distribution curves for these samples are shown in Figures 2-6A through C. Analysis of the bottom material taken from the proposed channel area in conjunction with the subsurface investigation program is shown in Figures 2-7A through C.

CHANNEL ANCHORAGE CROSS-SECTIONS

Data developed from the hydrographic survey and subsurface investigations were used to develop several representative cross-sections of the area selected for detailed study. In all areas a one foot allowable

TABLE 2-1
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
RESULTS OF PHYSICAL TESTING
Wood Island Harbor - Biddeford, ME
December 1987

LOCATION B-1

Test	Field Log No./Sample Locations #1*	#2*	#3*		
Visual Classification	gray poorly graded sand (SP)	gray poorly graded sand (SP)	gray poorly graded sand (SP)		
Depth (Feet)	surface	surface	surface		
Grain Size Curve					
Med (50% finer)	0.1200	0.1400	0.1300		
Q1 (75% finer)	0.1500	0.1700	0.1500		
Q3 (25% finer)	0.0961	0.1035	0.1044		
Soil Class/ Dominant	SP	SP	SP		
Normal/Bimodal	N	N	N		
% Coarse Mat'l (pass >#10 US Std Sieve)	1	1	2		
% Medium Sand (pass #10 Sieve retained #40 Sieve)	2	3	2		
% Fine Sand (pass #40 Sieve retained #200 US Std Sieve)	98	97	98		
% Fines (silt/ clay) pass #200 Sieve	1	1	1		
Specific Gravity	2.68	2.67	2.65		

* Samples taken from location B-1 shown on Figure 2-3

TABLE 2-2
WOOD ISLAND HARBOR & BIDDEFORD POOL
BIDDEFORD, MAINE

PHYSICAL TEST RESULTS - MARINE SEDIMENT - ENVIRONMENTAL SAMPLES

PARAMETER	SITE A	* SITE B	* SITE C	SITE D
VISUAL CLASSIFICATION	Brown, gravelly, med to fine sand (SP) w/shell fragments	Dark gray silty fine sand (SM)	Dark gray organic sandy silt (OH)	Dark gray organic Sandy silt (OH) w/shell fragments
Depth (feet)	Surface	0.0-1.2	0.0-2.5	0.0-1.15
Grain Size - Med (50% finer)	0.3000	0.1200	0.0220	0.0300
Grain Size - Q1 (75% finer)	0.5300	0.2000	0.0700	0.1300
Grain Size - Q3 (25% finer)	0.2200	0.0350	0.0150	0.0080
Normal (N) or Bimodal (B)	N	B	B	B
Specfic Gravity	2.67	2.58	2.53	2.43
% Fines	<1.0	40	77	58
Liquid Limit	non-plastic	46	92	95
Plastic Limit	non-plastic	31	53	52
Plastic Index	Non-plastic	15	39	43

* Note: These sample sites located in maintenance dredging areas; maitenance performed 3/89

TABLE 2-2 (cont.)
WOOD ISLAND HARBOR & BIDDEFORD POOL
BIDDEFORD, MAINE

PHYSICAL TEST RESULTS - MARINE SEDIMENT - ENVIRONMENTAL SAMPLES

PARAMETER	SITE E	SITE F	SITE G	SITE H
VISUAL CLASSIFICATION	Gray silty fine sand (SP-SM)	Gray Organic med. to fine sand (SP) w/shell fragments	Dark gray med. to fine sand (SP) w/shell fragments	Dark gray fine sand (SP)
Depth (feet)	0.0-1.55	0.0-1.5	0.0-1.7	surface
Grain Size - Med (50% finer)	0.1400	0.2300		0.1200
Grain Size - Q1 (75% finer)	0.1900	0.3500		0.1300
Grain Size - Q3 (25% finer)	0.1000	0.1800		0.1000
Normal (N) or Bimodal (B)	N			N
Specific Gravity	2.65	2.64		2.68
% Fines	9	5		2
Liquid Limit	non-plastic			non-plastic
Plastic Limit	non-plastic			non-plastic
Plastic Index	non-plastic			non-plastic

TABLE 2-2 (cont.)
WOOD ISLAND HARBOR & BIDDEFORD POOL
BIDDEFORD, MAINE

PHYSICAL TEST RESULTS - MARINE SEDIMENT - ENVIRONMENTAL SAMPLES

PARAMETER	SITE I	SITE J
VISUAL CLASSIFICAITON	Dark gray silty fine sand (SM) w/shell fragments	Brown med. to fine sand (SP) with shell fragments
Depth (feet)	surface	surface
Grain Size - Med (50% finer)		0.3500
Grain Size - Q1 (75% finer)		0.4500
Grain Size - Q3 (25% finer)		0.2500
Normal (N) or Bimodal (B)		N
Specific Gravity		2.67
% Fines		2
Liquid Limit		non-plastic
Plastic Limit		non-plastic
Plastic Index		non-plastic

TABLE 2-3
WOOD ISLAND HARBOR & BIDDEFORD POOL
BIDDEFORD, MAINE

BULK CHEMISTRY ANALYSIS - MARINE SEDIMENT - ENVIRONMENTAL SAMPLES

Sample Site	* SITE B		* SITE C		SITE D	
Depth (Ft)	0.0-0.25	1.10-1.35	0.0-0.25	2.25-2.5	0.0-0.25	0.85-1.1
% Solids	60.3	67.13	60.3	46.02	44.3	49.4
% Volitile Solids EPA	4.07	3.87	8.57	9.28	8.65	11.33
% Volitile Solids NED	3.49	3.29	7.58	8.32	6.89	8.48
Oil & Grease (ppm)	190	--	380	--	270	--
Mercury (ppm)	0.14	0.17	0.08	0.08	0.14	0.08
Lead (ppm)	7	9	20	20	26	25
Zinc (ppm)	23	40	58	65	72	68
Arsenic (ppm)	1.5	1.4	6.1	<1	5.2	8.6
Cadmium (ppm)	<1	<1	1	<1	1	<1
Chromium (ppm)	27	58	94	99	197	214
Copper (ppm)	6	5	10	11	12	11
Nickel (ppm)	<10	<10	<10	<10	12	--
Silver (ppm)	<1	<1	<1	<1	<1	<1
Vanadium (ppm)	<100	<100	<100	<100	<100	<100

* Note: These sample sites located in maintenance dredging areas; maintenance performed 3/89.

TABLE 2-3 (cont.)
WOOD ISLAND HARBOR & BIDDEFORD POOL
BIDDEFORD, MAINE

BULK CHEMISTRY ANALYSIS - MARINE SEDIMENT - ENVIRONMENTAL SAMPLES

Sample Site	SITE E		SITE F		SITE H
Depth (Ft)	0.0-0.25	1.4-1.65	0.0-0.25	1.6-1.85	surface
% Solids	79.3	73.8	--	--	--
% Volitile Solids EPA	0.58	1.45	--	--	0.86
% Volitile Solids NED	0.39	1.09	--	--	0.65
Oil & Grease (ppm)	50	--	--	--	50
Mercury (ppm)	0.05	0.24	0.23	0.23	0.14
Lead (ppm)	<2	<2	<2	<2	3
Zinc (ppm)	21	19	21	21	15
Arsenic (ppm)	1	1.1	<1	<1	<1
Cadmium (ppm)	<1	<1	<1	<1	<1
Chromium (ppm)	8	9	7	7	7
Copper (ppm)	3	3	3	3	<2
Nickel (ppm)	<10	<10	<10	<10	<10
Silver (ppm)	<1	<1	<1	<1	<1
Vanadium (ppm)	<100	<100	<100	<100	<100

TABLE 2-3 (cont.)
WOOD ISLAND HARBOR & BIDDEFORD POOL
BIDDEFORD, MAINE

BULK CHEMISTRY ANALYSIS - MARINE SEDIMENT - ENVIRONMENTAL SAMPLES

Sample Site	SITE I	SITE J
Depth (Ft)	surface	surface
% Solids	76.4	--
% Volitile Solids EPA	1.43	--
% Volitile Solids NED	1.05	--
Oil & Grease (ppm)	90	90
Mercury (ppm)	<0.05	0.06
Lead (ppm)	4	3
Zinc (ppm)	19	19
Arsenic (ppm)	1.2	1.6
Cadmium (ppm)	<1	<1
Chromium (ppm)	12	12
Copper (ppm)	3	2
Nickel (ppm)	<10	<10
Silver (ppm)	<1	<1
Vanadium (ppm)	<100	<100

TABLE 2-4
ELUTRIATE TESTING - WOOD ISLAND HARBOR
December 1983

Results of tests performed on: (1) the standard elutriate prepared form one part sediment taken at various sampling locations with four parts water from each sampling location and (2) virgin water from each sampling location are as follows:

	Dredge Site Water "C"	Standard Elutriate Designation and Sediment Depth Used in Preparation Location "C" 0.0-1.85 ft			Dredge Site Water "E"	Standard Elutriate Designation and Sediment Depth Used in Preparation Location "E" 0.0-1.4 ft		
		R1	R2	R3		R1	R2	R3
Test Property								
Nitrate/Nitrogen(N), ppm nitrite	<0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia nitrogen(N), ppm	0.42	6.20	6.70	6.85	0.39	1.16	1.26	1.19
Sulfate (SO), ppm	4,090	3,140	4,090	3,140	2,770	4,450	2,990	3,140
Oil and grease, ppm	<2	<2	<2	<2	<2	<2	<2	<2
Phosphorus								
ortho, ppm	0.02	0.14	0.22	0.27	0.02	0.05	0.05	0.05
total, ppm	0.02	0.16	0.24	0.28	0.06	0.07	0.07	0.06
Mercury (Hg), ppb	<0.50	0.52	<0.50		<0.50	<0.50	<0.50	<0.90
Lead (Pb), ppb	7	14	30	9	4	4	3	4
Zinc (Zn), ppb	<10	<10	<10	<10		<10	<10	<10
Arsenic (As), ppb	<3	<3	<3	<3	<3	<3	<3	<3
Cadmium (Cd), ppb	<0.5	<0.5	<2.9	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium (Cr), ppb	6	3	3	3	2	1	6	7
Copper (Cu), ppb	9.5	9.5	3.0		9.5	0.5	4.5	3.5
Nickel (Ni), ppb	<4	19	<4	12	<4	<4	<4	<4
Silver (Ag), ppb	<0.6	0.8	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Vanadium (V), ppb	<2.5	<2.5	<2.5	<2.5	2.5	9	<2.5	<2.5

TABLE 2-4 (cont')
PCB, DDT Analyses - Elutriate Testing
Planning Division - Coastal Development Projects
FY 83

Biddeford Pool and Wood Island Harbor, Maine

	Total PCB, ppb				Total DDT, ppb			
Location	Water	Elut Run 1	Elut Run 2	Elut Run 3	Water	Elut Run 1	Elut Run 2	Elut Run 3
C	0.022	2.91	4.79	0.07	<0.20	<0.20	<0.20	<0.20
E	0.023	0.901	0.037	<0.020	<0.20	<0.20	<0.20	<0.20

TABLE 2-5
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
RESULTS OF PHYSICAL TESTING
Wood Island Harbor, Maine
September 1988
DISPOSAL SITE

Test	Field Log No./Sample Locations #1	#2	#3		
Visual Classification	light brown poorly graded medium to fine sand (SP)	light brown poorly graded medium to fine sand (SP)	light brown poorly graded medium to fine sand (SP)		
Grain Size Curve					
Med (50% finer)	0.4500	0.4100	0.4000		
Q1 (75% finer)	0.6500	0.5500	0.6000		
Q3 (25% finer)	0.3000	0.2800	0.2700		
Soil Class/ Dominant	SP	SP	SP		
Normal/Bimodal	N	N	N		
% Coarse Mat'l (pass >#10 US Std Sieve)	<1	<1	<1		
% Medium Sand (pass #10 Sieve retained #40 Sieve)	52	48	48		
% Fine Sand (pass #40 Sieve retained #200 US Std Sieve)	48	52	52		
% Fines (silt/ clay) pass #200 Sieve	<1	<1	<1		
Specific Gravity	2.64	2.64	2.64		

overdepth and a 1 on 3 side slope was assumed for ordinary material. Typical cross-sections for the areas to be dredged are shown in Figure 2-8, and the locations of these cross-sections appear in Figure 2-9.

QUANTITY ESTIMATES

In order to determine quantities of material to be removed under each plan, quantity estimates were developed for selected dredge depths chosen for detailed analysis. These incremental dredge quantities are shown in Table 2-6.

TABLE 2-6
WOOD ISLAND HARBOR, ME
QUANTITIES OF MATERIAL TO BE REMOVED
ESTIMATED VOLUMES (CUBIC YARDS)

Plan	Cut to Depth	Overdepth Increment	Total Volume
PLAN A - 8-Foot Channel (3 week constr. period)			
-Ordinary Material	1,623	3,627	5,250
-Rock	None	None	None
PLAN B - 10-Foot Channel (3 week constr. period)			
-Ordinary Material	10,025	5,975	16,000
-Rock	None	None	None
PLAN C - 12-Foot Channel (4 week constr. period)			
-Ordinary Material	23,650	9,750	33,400
-Rock	None	None	None

SECTION B

DESIGN AND COST ESTIMATES

ANALYSIS OF PLANS

Three detailed plans were selected for study. Plan A includes providing a navigation channel through Wood Island Harbor to the entrance of Biddeford Pool that is 4,200 feet long, 100 feet wide and 8 feet deep at MLW. Plan B specifies a depth of 10 feet at MLW and Plan C specifies a depth of 12 feet at MLW, with the same channel length and width. All three plans involve dredging ordinary material. In each case, the material would be removed by hydraulic dredge and pumped approximately 1/2 mile to the disposal site. The disposal site for all three plans would be at the inter-island sand bar located between Basket Island and Stage Island. Costs provided include contingencies; monies for supervision and administration, engineering, and design. In order to accomplish the dredging and disposal of ordinary material under each plan, a typical construction plant consisting of the following equipment would be necessary: a Derrick barge, a hydraulic dredge with a 14" discharge pipe, a 165 Horsepower launch and a tug boat. Construction periods, including time for mobilization and demobilization, are estimated to be approximately three weeks for Plans A and B and four weeks for Plan C. All estimates are based on a 7 day work week with 24 hour work days. The alternative plans of improvement are shown in Figure 2-10.

QUANTITIES OF MATERIAL TO BE REMOVED

The quantities of material to be removed were calculated for each of the proposed dredge depths. The incremental dredged quantities are shown in Table 2-6 and are based on one foot of allowable dredge overdepth for ordinary material.

COST ESTIMATES

The cost estimates for dredging are based on the construction duration given in Table 2-6. Any costs associated with the disposal of the material are included in the estimates. The costs shown in Table 2-7 through Table 2-9 are computed using May 1989 price levels.

TABLE 2-7
WOOD ISLAND HARBOR, ME
PLAN A
FIRST COST OF FEDERAL IMPROVEMENT
8-FOOT CHANNEL

*Dredging	
Ordinary material at $22.30/cy	
5,250 cubic yards	$ 117,000
Contingencies	23,000
Construction Cost	$ 140,000
Engineering and Design	22,000
Supervision and Administration	36,000
TOTAL FIRST COST	$ 198,000
**Interest During Construction (1 month)	-0-
Aids to Navigation	8,000
Total Investment	$ 206,000

* Includes mobilization, demobilization, contractor's overhead, bond cost, and profit.

** Use a minimum of 1 month for IDC calculations.

TABLE 2-8
WOOD ISLAND HARBOR, ME
PLAN B
FIRST COST OF FEDERAL IMPROVEMENT
10-FOOT CHANNEL

*Dredging	
Ordinary Material at $9.00/cy	
16,000 cubic yards	$ 144,000
Contingencies	29,000
Construction Cost	$ 173,000
Engineering and Design	22,000
Supervision and Administration	39,000
TOTAL FIRST COST	$ 234,000
**Interest During Construction (1 month)	-0-
Aids to Navigation	8,000
Total Investment	$ 242,000

* Includes mobilization, demobilization, contractor's overhead, bond cost, and profit.

** Use a minimum of 1 month for IDC calculations.

TABLE 2-9
WOOD ISLAND HARBOR, ME
PLAN C
FIRST COST OF FEDERAL IMPROVEMENT
12-FOOT CHANNEL

*Dredging Ordinary Material at $5.30/cy 33,400 cubic yards	$ 177,000
Contingencies	35,000
Construction Cost	$ 212,000
Engineering and Design	23,000
Supervision and Administration	41,000
TOTAL FIRST COST	$ 276,000
**Interest During Construction (1 month)	-0-
Aids to Navigation	8,000
Total Investment	$ 284,000

* Includes mobilization, demobilization, contractor's overhead, bond cost, and profit.

** Use a minimum of 1 month for IDC calculations.

SELECTED PLAN

The Selected Plan, as determined through economic and environmental analysis, is Plan B. The plan involves providing a channel through Wood Island Harbor to the entrance of Biddeford Pool that is 4,200 feet long, 100 feet wide and 10 feet deep at MLW. Completion of this work would require dredging 16,000 cubic yards of ordinary material. This would provide the existing commercial fleet with safe access to the Pool and existing docking areas, at all tidal stages, thereby increasing operational efficiency. The recommended plan of improvement is shown in Figure 2-11.

AIDS TO NAVIGATION

Specific cost for aids to navigation will be obtained from the U.S. Coast Guard, which would be responsible for placing and maintaining any aids they deem necessary for boating safety. For purposes of this report, assumptions were made regarding requirements for such aids.

There is one existing Coast Guard navigation buoy located half way through Wood Island Harbor. It is estimated that two additional navigation aids will be required to mark the entrance of this Federal channel.

DISPOSAL OF DREDGED MATERIAL

Initially, disposal of the channel improvement material was to be as beach nourishment for Hills Beach in Biddeford. The material would have been pumped approximately 1 mile directly to the beach. However, during the course of the environmental studies it was determined that disposal on the beach would severely impact intertidal habitats. Consequently, the site was dropped as a disposal area.

The selected disposal site for the dredged material as described in the Main Report and Environmental Assessment is the seaward face of the inter-island sand bar between Stage Island and Basket Island. This disposal area is located approximately 2800 feet from the proposed construction area in Wood Island Harbor. Material dredged from the proposed plans would be pumped directly to the site in a slurry form. The material would be deposited only during outgoing, slack, and incoming (to the top of the sand bar) tides to take advantage of the sand bar's natural "trapping" capabilities; eliminating migration of the sand toward sensitive benthic areas landward toward Hills Beach. Repositioning of the discharge pipe, along with the natural tidal forces, would spread the settled material evenly over the disposal area.

MAINTENANCE COSTS

Maintenance of various navigation improvements proposed under each alternative plan would be necessary at estimated intervals throughout the 50-year project life. Maintenance of the channel to its authorized depth would be necessary to ensure the continued efficiency of the developed area. Continued maintenance of the existing aids to navigation would also be necessary.

Following initial dredging the channel would tend to shoal or fill in because of settlement of material from side slopes, deposition of material derived from upland erosion, and from current/tidal action.

Channel side slopes would be designed in such a way as to enhance long-term stability although changes to the bottom contours would occur over time, resulting in gradual flattening of the slopes. Strong current action occurring during storms may result in the movement of bottom sediments. The propeller wash and waves produced by passing vessels would also tend to disturb the channel bottom, resulting in the redistribution of bottom sediments.

There has never been any maintenance dredging in Wood Island Harbor due to the lack of a Federal project in the area. Maintenance of the Biddeford Pool has been done as recently as 1989.

In order to determine annualized maintenance cost resulting from the proposed improvements, estimates were made of the without improvement condition. Over the past 40 years, there have been three surveys of Wood Island Harbor done, at 20 year intervals. From the surveys shoaling data was developed and it was determined that the average annual shoaling rate for maintaining the project would be approximately 178 cubic yards per year.

The proposed alternatives would alter the water depths of Wood Island Harbor in the immediate dredging area by 2, 3 or 4 feet. Sedimentation due to the upland erosion would not be increased by the proposed alternatives. However, there would be some initial side slope settling due to the strong tidal currents in the area. If implemented, the project would need to be maintained at least once during the project life. For purposes of economic analysis an annual shoaling rate of 178 cubic yards per year of material for each plan will be used. The estimated annual cost for maintenance dredging is shown in Table 2-10.

TABLE 2-10
WOOD ISLAND HARBOR, ME
MAINTENANCE DREDGING COSTS

	PLAN A 8-Feet	PLAN B 10-Feet	PLAN C 12-Feet
Improvement Quantity (Ordinary Material)	5,250	16,000	33,400
Annual Shoaling Rate (cy/year)	178	178	178
Cost/cy (Ordinary Material) including disposal, E&D, and S&A	$37.00	$37.00	$37.00
Annual Maintenance	$6,600	$6,600	$6,600

These maintenance figures are based on the assumption that maintenance would occur approximately half way through the project life and that it would be a "one time" contractor mobilization effort. Due to the proximity of several Federal projects in the area it may be possible in the future to maintain several projects at once, thus reducing the estimated annual maintenance cost for this project.

Future maintenance dredging activity could possibly make use of the disposal area identified in this study or the Saco Bay disposal area currently being used to handle the Biddeford Pool maintenance work. However, the actual determination of a disposal site would be done at such time that maintenance was required. If no site were available it would be the local responsibility to locate an appropriate disposal site and fund construction of any necessary features as defined in point 3 of the items of local assurance found in the main report.

ANNUAL CHARGES

Annual charges assessed to each detailed plan are a combination of annual maintenance costs and the annual interest and amortization charges resulting from the cost of improvement assessed over the 50-year project life. The charge for interest and amortization is based on a rate of 8 7/8 percent. The maintenance charge for navigation aids is estimated to be $500 per added buoy. The annual charges for each plan are shown in Table 2-11.

TABLE 2-11
WOOD ISLAND HARBOR, ME
FEDERAL PROJECT ALTERNATIVES
SUMMARY OF ANNUAL CHARGES

PLAN A

Amortization of Total Investment Cost	$ 18,500
Maintenance Dredging	6,600
Maintenance of Navigation Aids	1,000
TOTAL ANNUAL CHARGES	$ 26,100

PLAN B

Amortization of Total Investment Cost	$ 21,800
Maintenance Dredging	6,600
Maintenance of Navigation Aids	1,000
TOTAL ANNUAL CHARGES	$ 29,400

PLAN C

Amortization of Total Investment Cost	$ 25,600
Maintenance Dredging	6,600
Maintenance of Navigation Aids	1,000
TOTAL ANNUAL CHARGES	$ 33,200

CORPS OF ENGINEERS

U. S. ARMY

INDEX OF FLOATING AIDS			
NO.	DATE	STATE PLANE COORDINATES	GEOGRAPHIC POSITION
RN-10	1-16-87	N 223,274 E 449,215	43°-26'-44.8"N 70°-21'-28.4"W
BC-7	1-14-87	N 225,991 E 451,422	43°-27'-11.7" N 70°-20'-58.6 "W

PLAN
SCALE 1"=200'

LOCATION MAP
SCALE 1"=37.5 MILES

GENERAL NOTES:

Soundings are in feet and tenths and are referred to the plane of Mean Low Water (M.L.W.).
Topography from previous surveys.
Bench Mark Data: Bench Mark #4 (1959) is a standard disk stamped "No. 4 (1959)", set flush in center of south wall of boat ramp on property of Dr. John C. Oddy. It is .5 ft. west of most western granite fence column, 20 ft. east of high water line and 79 ft. northeast of northeast corner of Biddeford Pool Yacht Club.
Elevation is 11.84 feet above M.L.W.
Coordinates are based on the Transverse Mercator System for the State of Maine. (West Zone)
"The sounding information depicted on this map represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during January 1987. This information should NOT be used to determine volumes."
"The information depicted on this map represents the results of surveys made on the dates indicated, and can only be considered as indicating the general conditions existing at that time."
Fieldbook: R & H 4315
Depthsounder Roll: 87-2 & 87-13
Survey by: T. Ober and party

GRAPHIC SCALES
1"=37.5MI. 25 0 25 50 75MI.
1"=200FT. 200' 0 200' 400'

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY W.M.K. DR. BY W.M.K. CH. BY
SUBMITTED: PROJECT MANAGER
REVIEWED: CHIEF, COAST. ENG./SUR. SECT.
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH

WOOD ISLAND HARBOR, MAINE AND THE POOL AT BIDDEFORD
CONDITION SURVEY
6-FT. BASIN

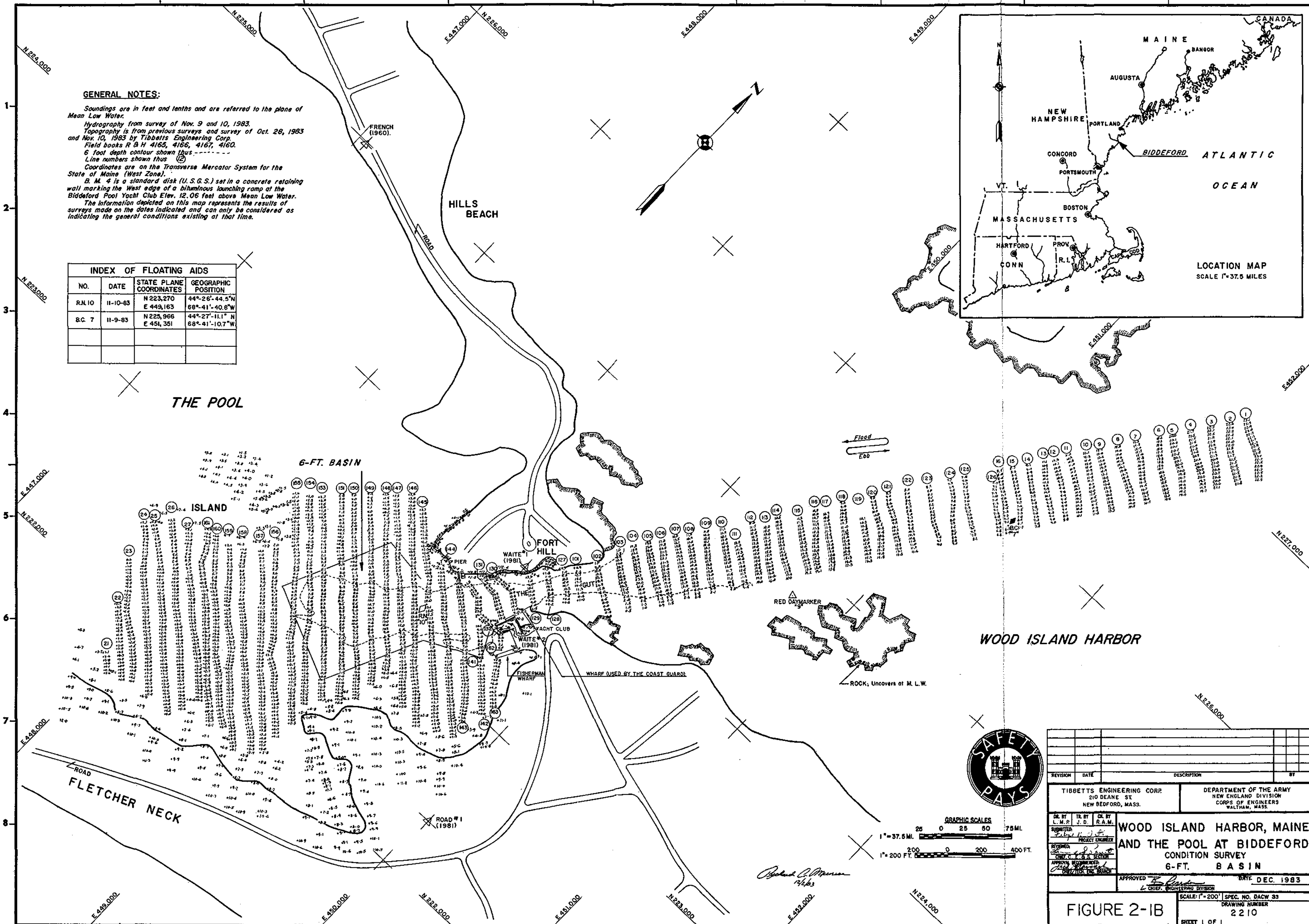
PROJECT NO. 49.0
APPROVED: CHIEF, ENGINEERING DIVISION
DATE MARCH 1987

SCALE as shown | SPEC. NO. DACW 33
DRAWING NUMBER
SHEET 1 OF 1

FIGURE 2-1A

BIDDEFORD POOL, ME. SHEET 1 OF 1

CORPS OF ENGINEERS U. S. ARMY



GENERAL NOTES:

Soundings are in feet and tenths and are referred to the plane of Mean Low Water.

Hydrography from survey of Nov. 9 and 10, 1983.

Topography is from previous surveys and survey of Oct. 28, 1983 and Nov. 10, 1983 by Tibbetts Engineering Corp.

Field books R & H 4165, 4166, 4167, 4160.

6 foot depth contour shown thus --------

Line numbers shown thus (12)

Coordinates are on the Transverse Mercator System for the State of Maine (West Zone).

B. M. 4 is a standard disk (U. S. G. S.) set in a concrete retaining wall marking the West edge of a bituminous launching ramp at the Biddeford Pool Yacht Club Elev. 12.06 feet above Mean Low Water.

The information depicted on this map represents the results of surveys made on the dates indicated and can only be considered as indicating the general conditions existing at that time.

INDEX OF FLOATING AIDS			
NO.	DATE	STATE PLANE COORDINATES	GEOGRAPHIC POSITION
R.N. 10	11-10-83	N 223,270 E 449,163	44°-26'-44.5"N 68°-41'-40.6"W
B.C. 7	11-9-83	N 225,966 E 451,351	44°-27'-11.1" N 68°-41'-10.7"W

Job No. 5345-T1

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0002

Site Wood Island Harbor, Biddeford, ME — Page 1 of 2 Pages

Hole No. FD-87-1 Diam. (Casing) _____ — Boring Started November 24, 1987

Co-ordinates: N 43°27'12"E 70°21'03" — Boring Completed November 24, 1987

Drilled by Cambridge and Gordon — Report Submitted November 30, 1987

Purpose of Exploration Exploration for obtaining sample of bottom sediment for environmental purposes.

Elevation Top of Hole -6' (mlw) M.S.L. — Casing Left in Place -0- Feet

Total Overburden Drilled 5' Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole -11' M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 5' Feet

Core Recovered — %

Core Recovered - Ft.: - Diam. - in.

Soil Samples - in. Diam. - No.

Soil Samples - in. Diam. - No. — Water Table Depth NA

Depth From	Depth To	Method of Drilling and Type of Bit Used
-6	-11	1 3/8" split spoon sampler driven with 140 lbs. hammer

INDEX

Ground Water _____ Back of Page ____

Boring Location Sketch _____ Back of Page ____

Overburden Record _____ Page ____

Rock Drilling _____ Page ____

_____ Page ____

_____ Page ____

_____ Page ____

Prepared by Gregory R. Hargrave
Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

FIGURE 2-2A

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Wood Island Harbor, Bidd., ME Page 1 of 2 Pages

Boring No. FD-87-1 Desig. _____ Diam. (Casing) _____

Co-ordinates: N _____ E _____

Elevation Top of Boring -6' (mlw) M.S.L. Hammer Wt. 140 lbs. Boring Started 11/24/87

Total Overburden Drilled 5' Feet Hammer Drop 30" Boring Completed 11/24/87

Elevation Top of Rock -- M.S.L. Casing Left 0'

Total Rock Drilled -- Feet Subsurface Water Data NA Page _____

Elevation Bottom of Boring -11' (mlw) M.S.L. Obs. Well _____

Total Depth of Boring 5' Feet Drilled By Cambridge & Gordon

Core Recovered -- % No. Boxes -- Mfg. Des. Drill _____

Core Recovered -- Ft. -- Diam. -- In. Inspected By: Greg Hargrave

Soil Samples 2 1/4 In. Diam. 1 No. Classification By: Greg Hargrave

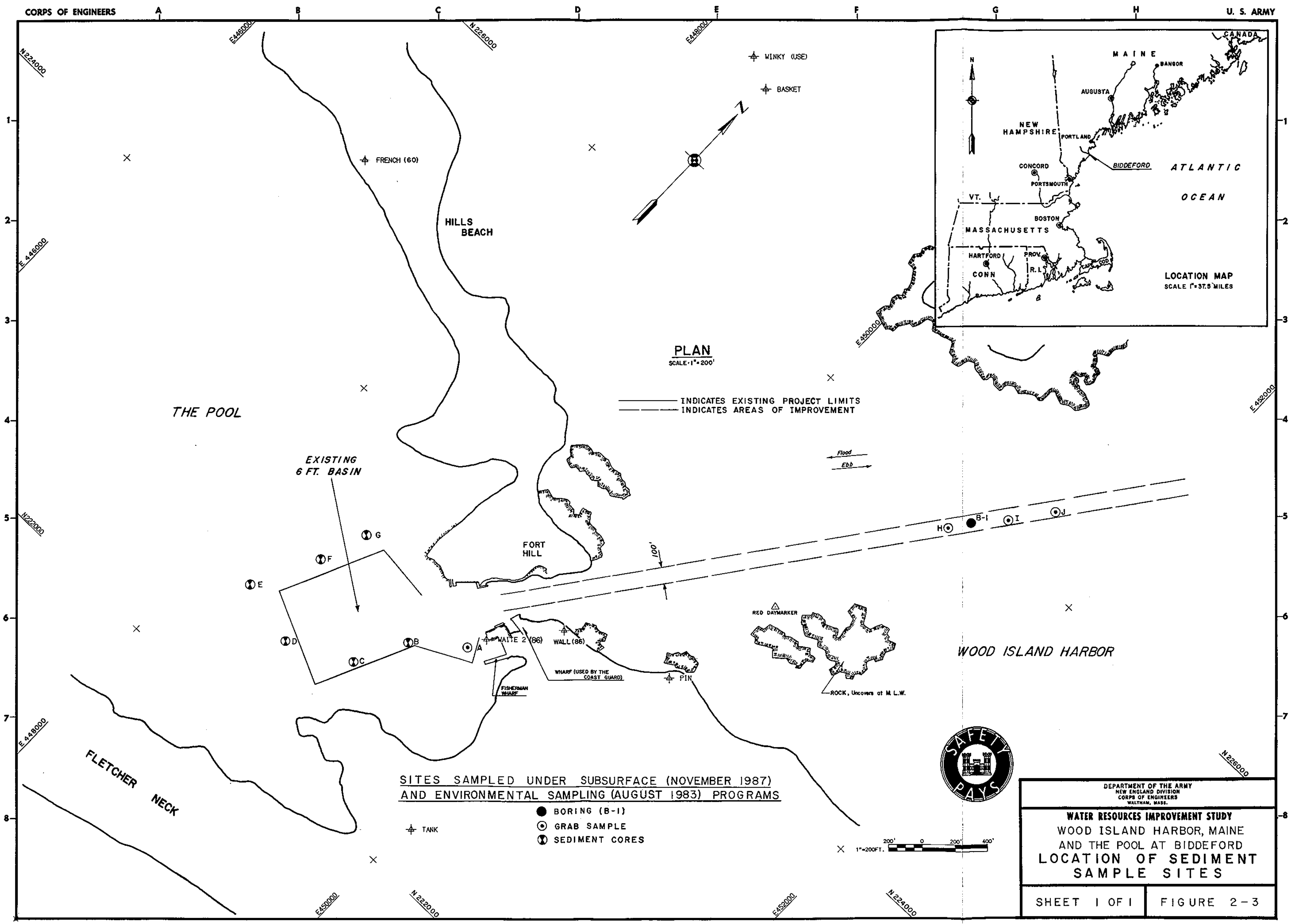
Soil Samples _____ In. Diam. _____ No. Classification By: _____

DEPTH	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER FT. CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
+1			Rec			
0						
2'						
4'						
6'						
8'			0%	WOM 2	1 3/8" I.D. split spoon sampler was advanced -6'mlw to -11'mlw using a 140 lbs. hammer, no sample was retained with the split spoon sampler	Grey Fine Sand, trace organic material (SP)
10'				3 2		
11'-				2		
12'					Boring terminated @ 11' below mlw on 11/24/87	Note: a diver obtained bottom sediment samples after drillers attempts to obtain bottom sediment samples with both 2" and 3" O.D. sampling spoons
14'						
16'						

GENERAL REMARKS:

Depths are shown below Mean Low Water (MLW)

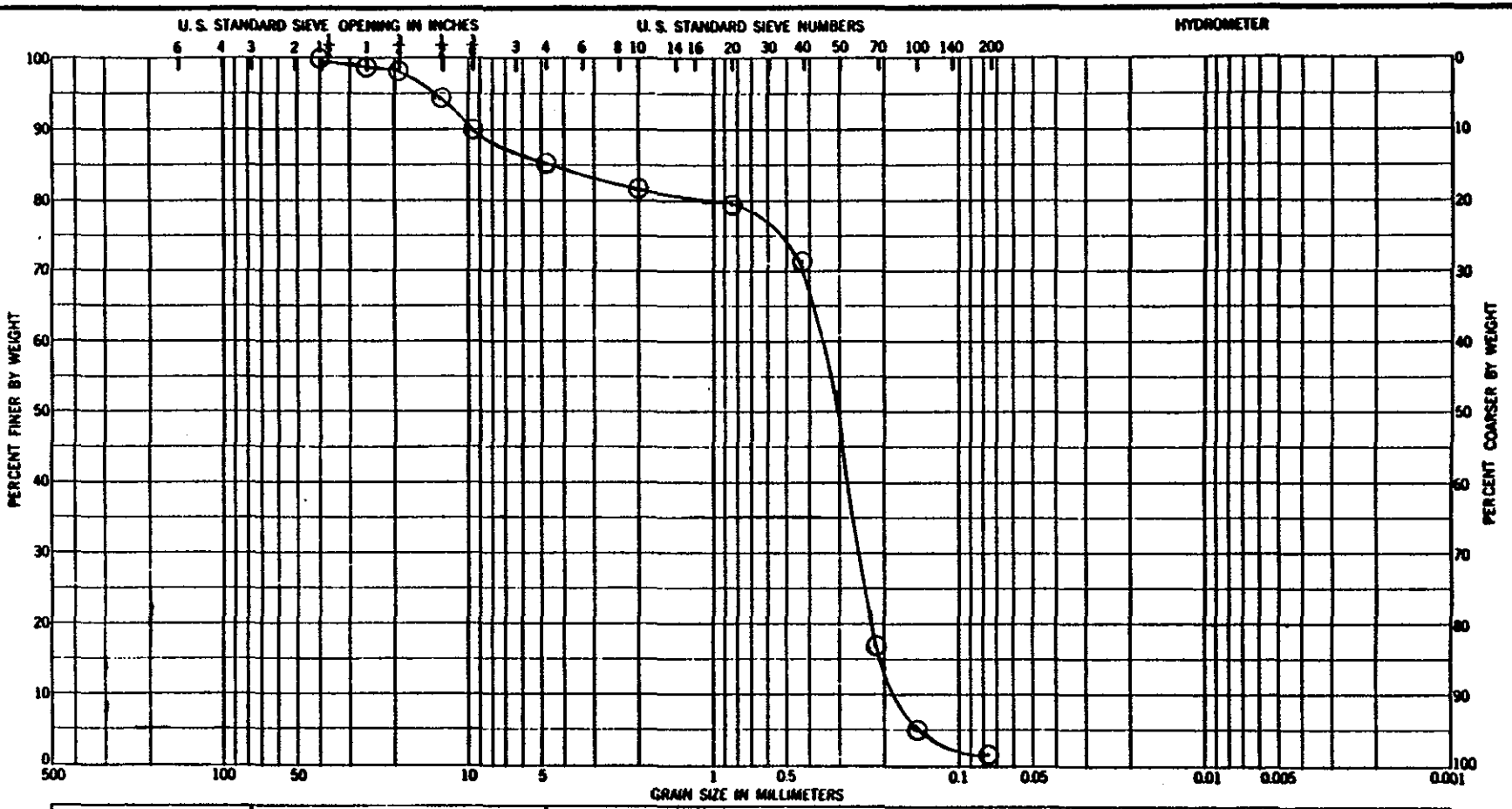
FIGURE 2-2B


CORPS OF ENGINEERS
U. S. ARMY
N224000
E446000
N226000
E448000
E450000
E452000
N222000
E 446000
E 448000
WINKY (USE)
BASKET
FRENCH (60)
HILLS BEACH
PLAN
SCALE: 1"=200'
INDICATES EXISTING PROJECT LIMITS
INDICATES AREAS OF IMPROVEMENT
THE POOL
EXISTING 6 FT. BASIN
Flood
Ebb
FORT HILL
100'
H
B-1
I
J
G
F
E
D
C
B
A
WAITE 2 (86)
WALL (86)
RED DAYMARKER
WHARF (USED BY THE COAST GUARD)
FISHERMAN WHARF
PIN
ROCK, Uncovers at M. L.W.
WOOD ISLAND HARBOR
FLETCHER NECK
SITES SAMPLED UNDER SUBSURFACE (NOVEMBER 1987) AND ENVIRONMENTAL SAMPLING (AUGUST 1983) PROGRAMS
BORING (B-1)
GRAB SAMPLE
SEDIMENT CORES
TANK
1"=200FT.
200' 0 200' 400'
SAFETY PAYS
CANADA
MAINE
BANGOR
AUGUSTA
NEW HAMPSHIRE
PORTLAND
BIDDEFORD
ATLANTIC OCEAN
CONCORD
PORTSMOUTH
VT.
BOSTON
MASSACHUSETTS
HARTFORD
PROV.
R.I.
CONN
CAPE COD
LOCATION MAP
SCALE 1"=37.5 MILES
N
BIDDEFORD POOL, ME. SHEET 1 OF 1

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES IMPROVEMENT STUDY
WOOD ISLAND HARBOR, MAINE
AND THE POOL AT BIDDEFORD
LOCATION OF SEDIMENT SAMPLE SITES

SHEET 1 OF 1 | FIGURE 2-3



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
A	Surface	Brown, gravelly medium fine sand (SP) w/shell fragments and marine odor				
		Sp. Gr. = 2.67				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: A

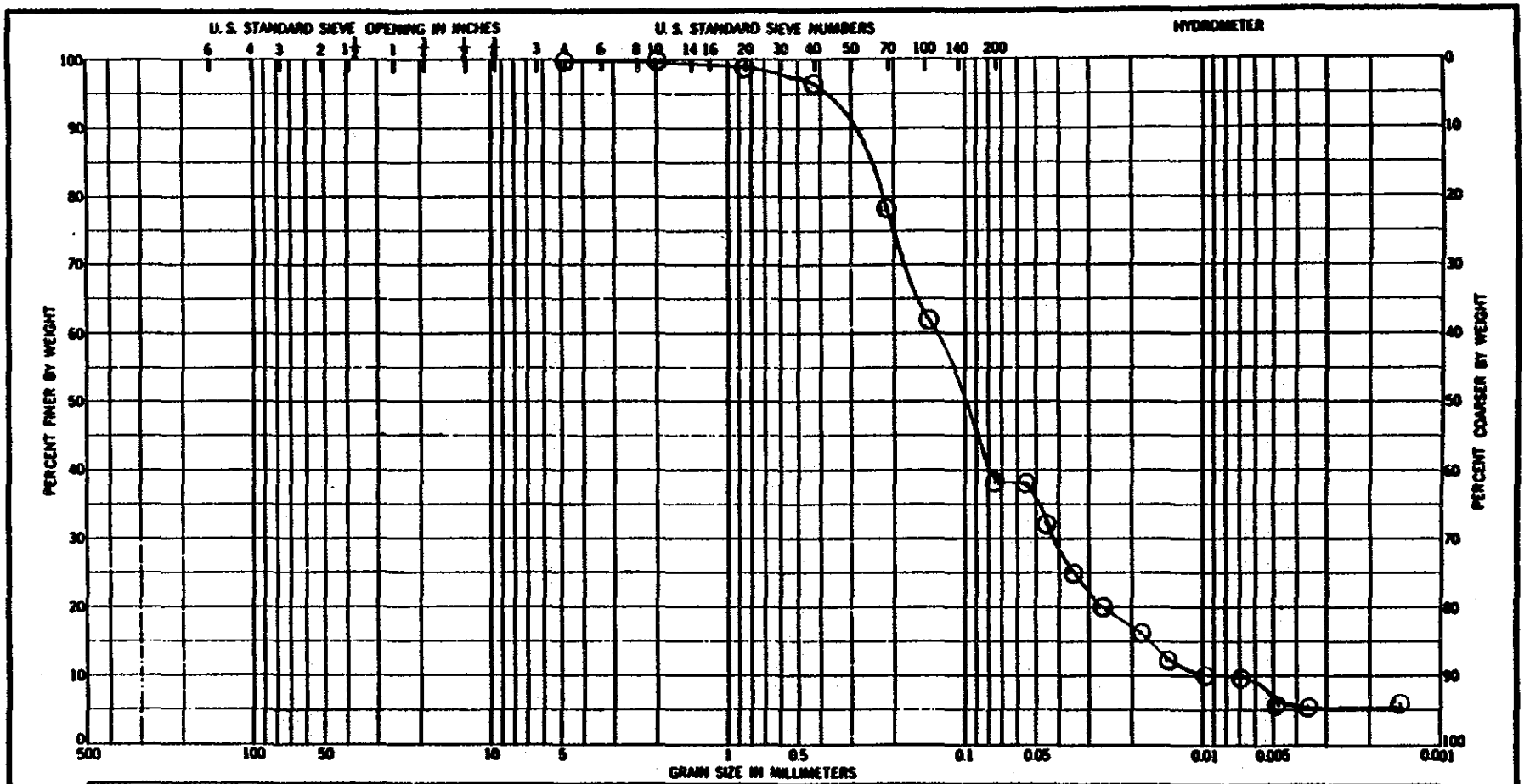
Boring No.: 100 - 370 - 1

Date: 12/14/83

ENG FORM 1 MAY 63 2087

GPO 926-280

FIGURE 2-4A



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B	0.0'- 1.2'	Dark gray - silty fine sand (SM) w/marine odor		46	31	15
		Sp. Gr. = 2.58				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: B

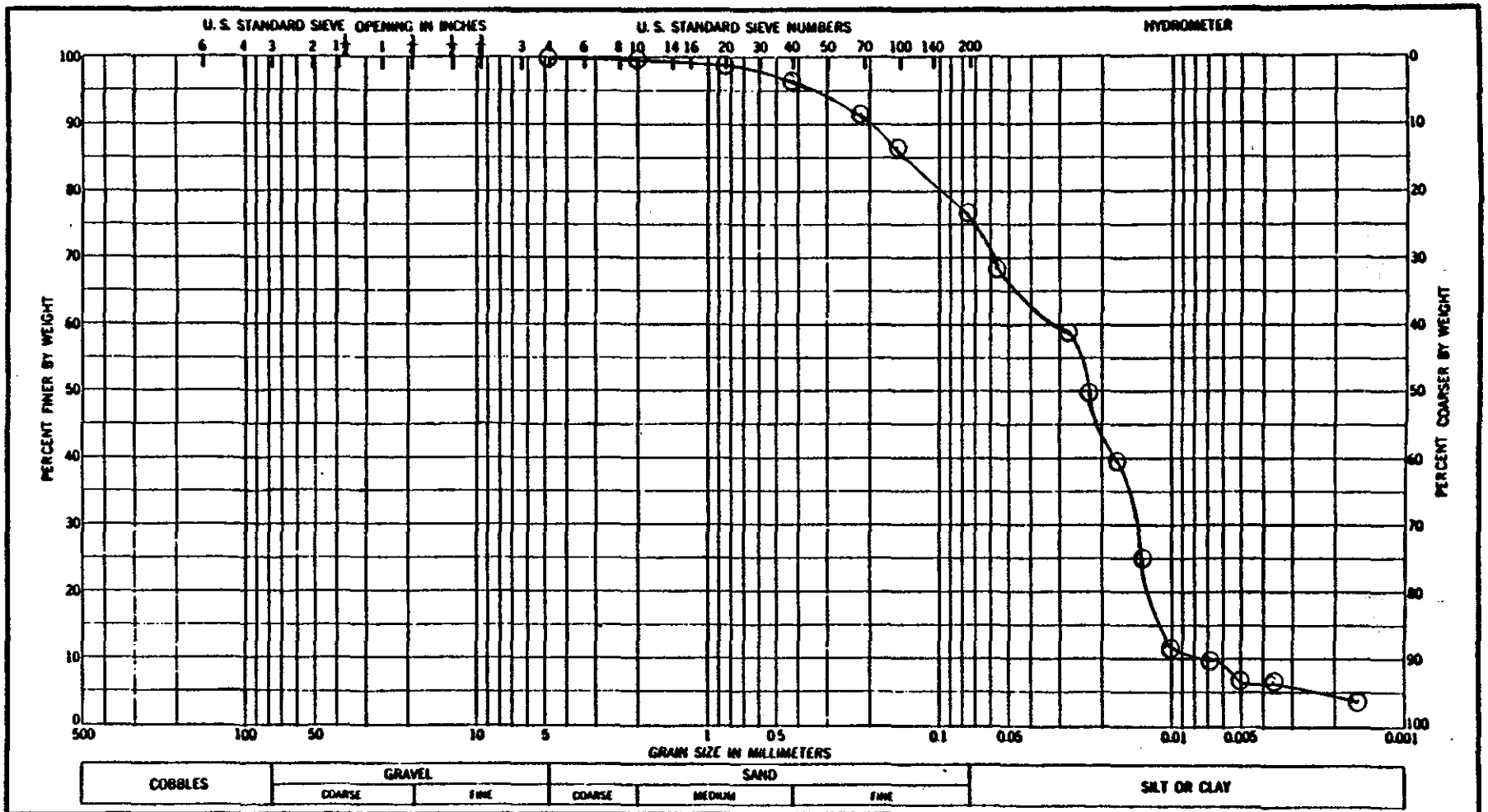
Boring No.: 100 - 370 - 2

Date: 12/14/83

ENG FORM 2087 MAY 83

GPO 826-260

FIGURE 2-4B



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
C	0.0'-1.2'	Dark gray - organic sandy silt (OH) w/marine odor		92	53	39
		Sp. Gr. = 2.53				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: C

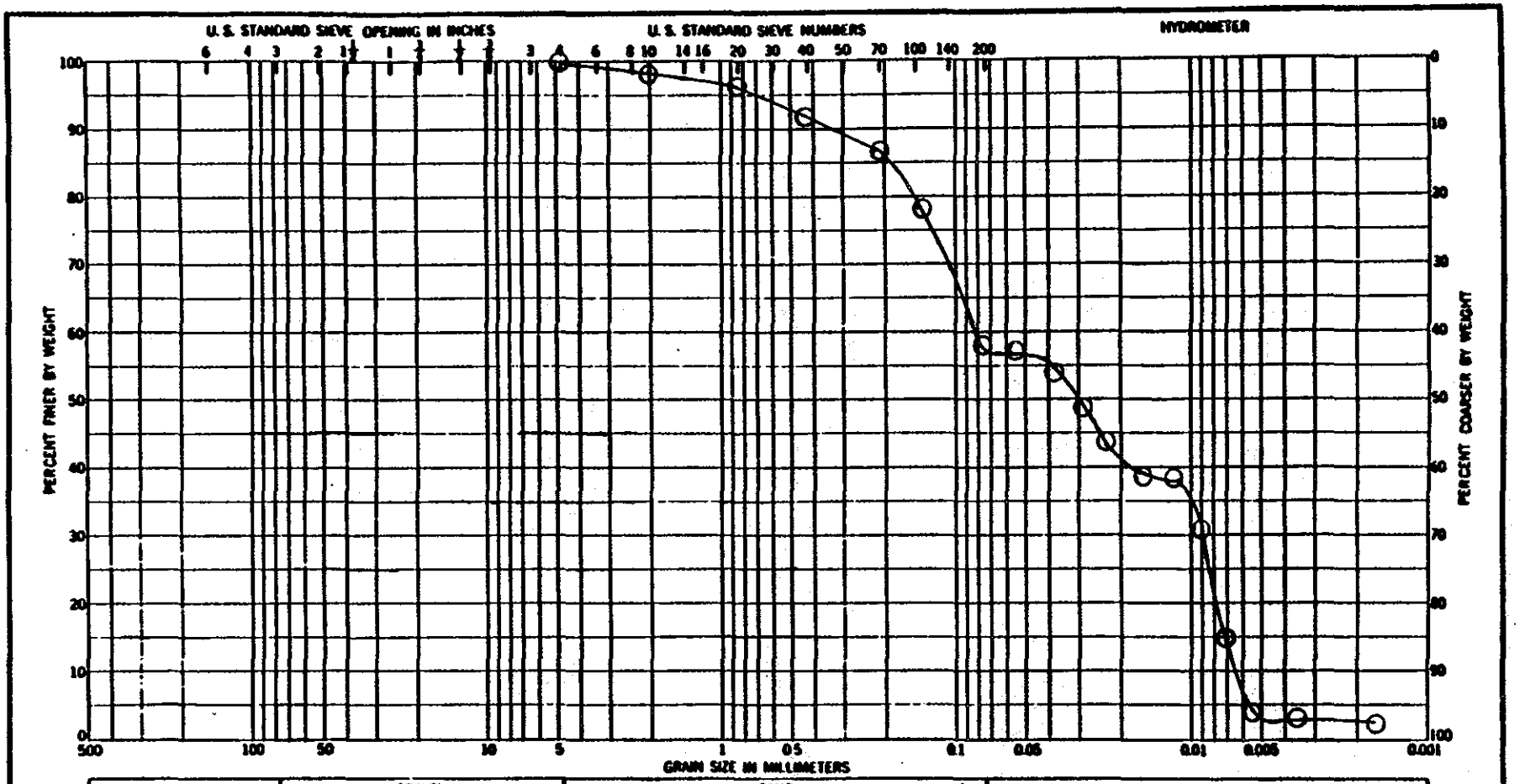
Boring No.: 100 - 370 - 3

Date: 12/16/83

ENG FORM 1 MAY 83 2087

GPO 826-260

FIGURE 2-4C



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
D	0.0'-1.15'	Dark gray - organic sandy silt (OH) w/shell fragments and marine odor		95	52	43
		Sp. Gr. = 2.43				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: D

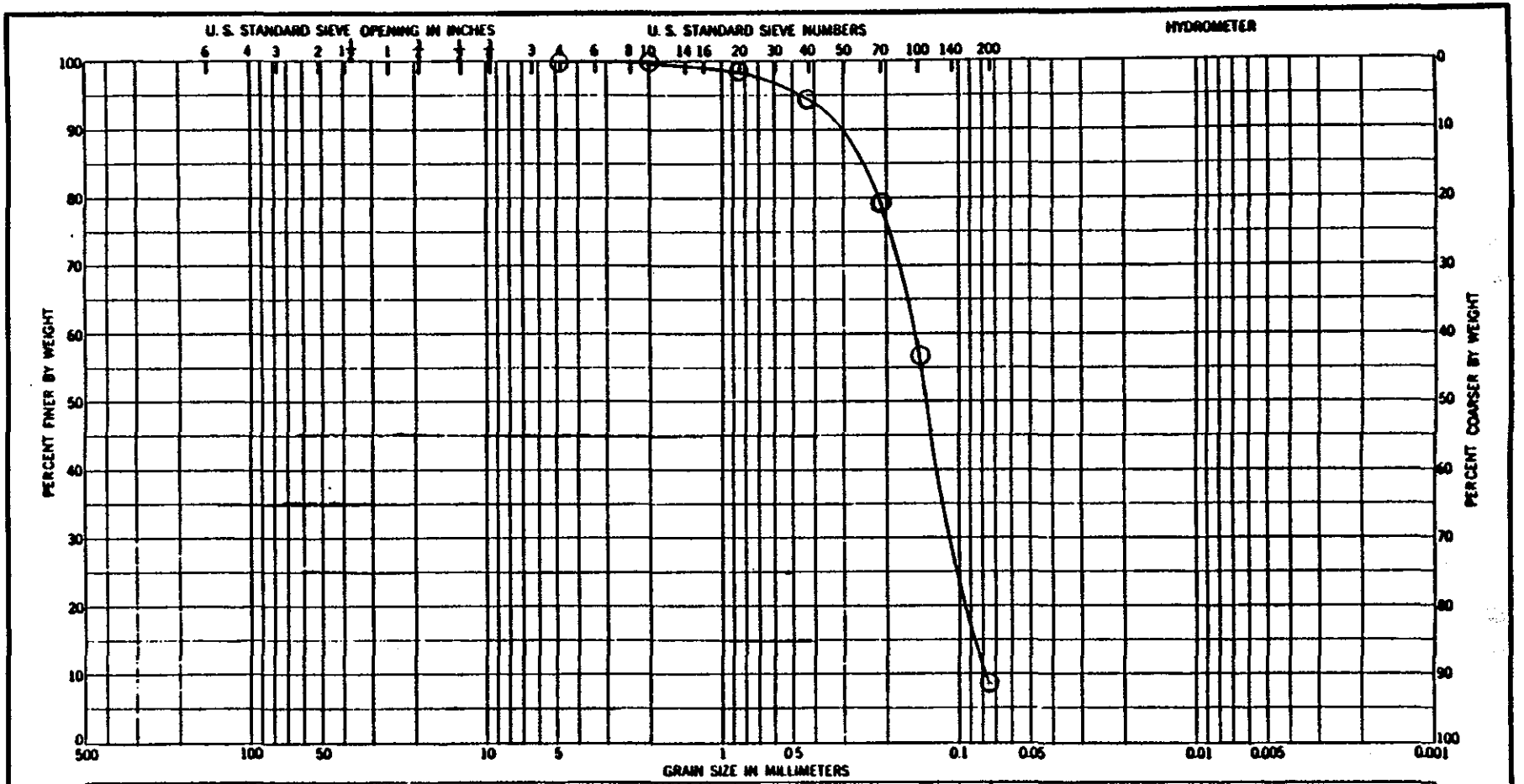
Boring No.: 100 - 370 - 4

Date: 12/16/83

ENG FORM 1 MAY 63 2087

GPO 826-280

FIGURE 2-4D



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
E	0.0'-1.55'	Gray - silty fine sand				
		(SP - SM) w/marine odor				
		Sp. Gr. = 2.65				

GRADATION CURVES

Project BIDDEFORD POOL, MAINE

Area E

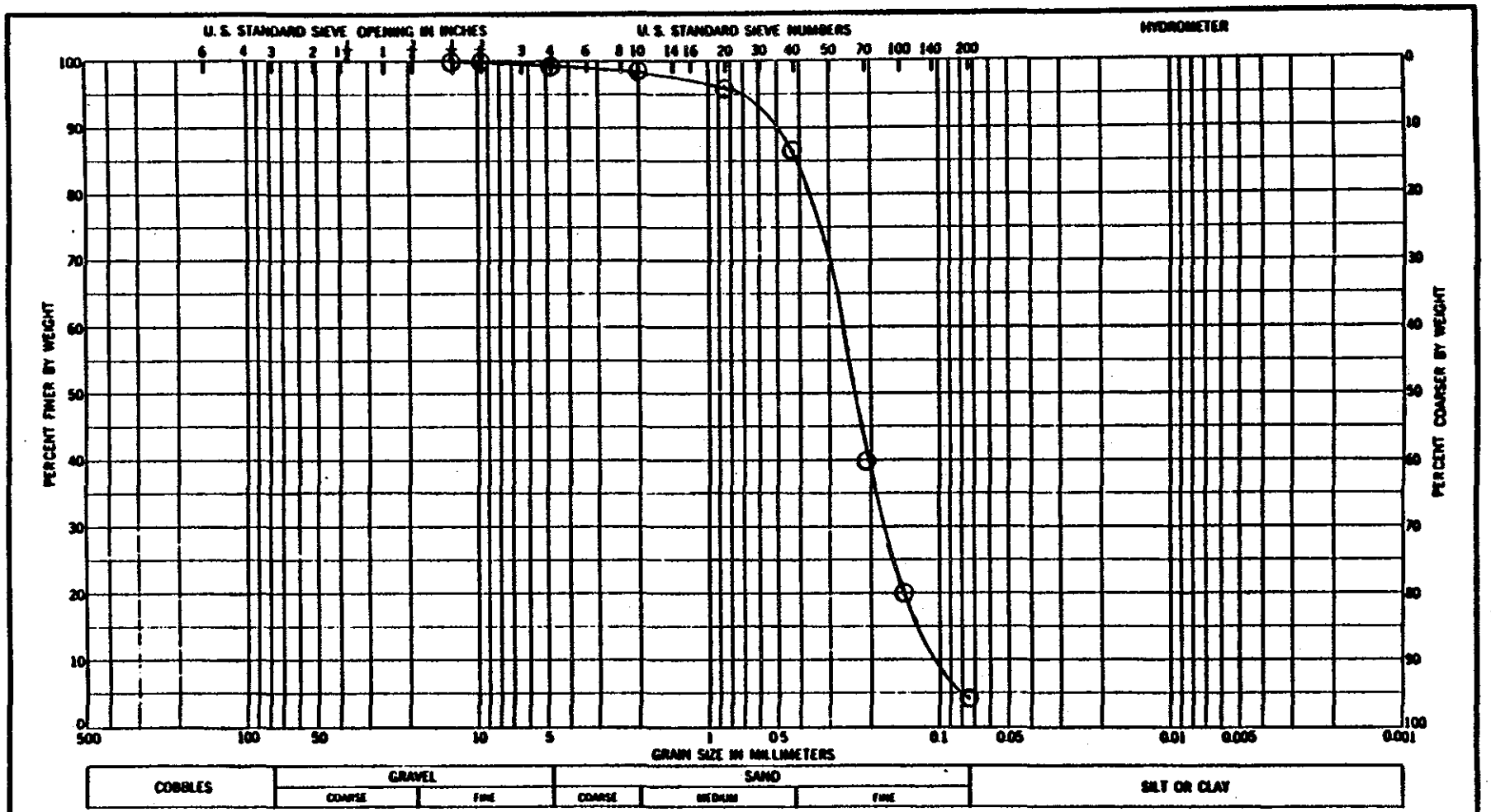
Boring No. 100 - 370 - 5

Date 12/16/83

ENG FORM 1 MAY 83 2087

GPO 826-280

FIGURE 2-4E



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
F	0.0'-1.5'	Gray - organic medium fine sand (SP) w/shell fragments and marine odor				
		Sp. Gr. = 2.64				

GRADATION CURVES

Project BIDDEFORD POOL, MAINE

Area F

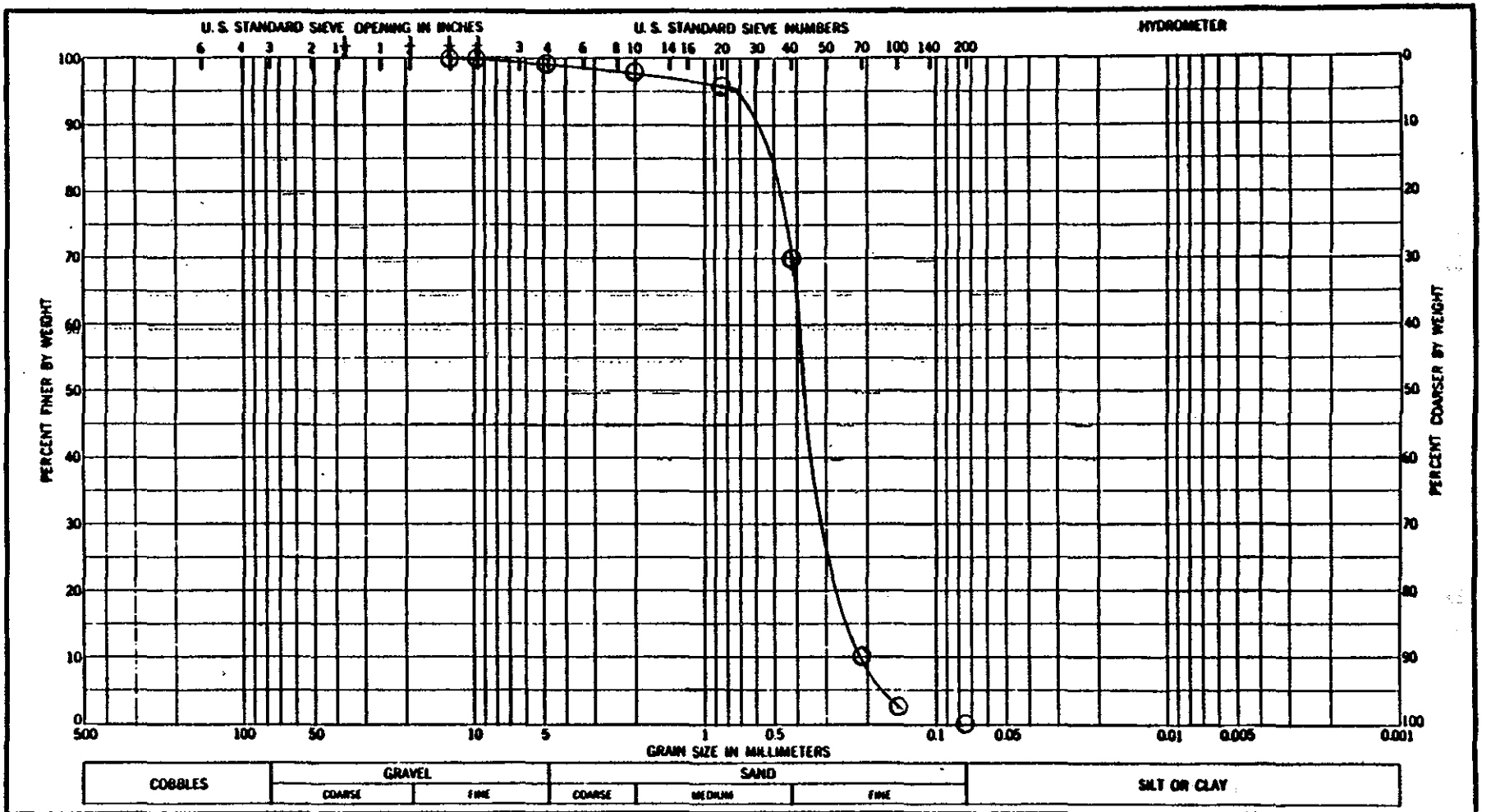
Boring No. 100 - 370 - 6

Date 12/16/83

ENG FORM 1 MAY 83 2087

GPO 826-280

FIGURE 2-4F



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
G	0.0'-1.7'	Dark gray - medium fine sand (SP) w/shell fragments and marine odor				

GRADATION CURVES

Project BIDDEFORD POOL, MAINE

Area G

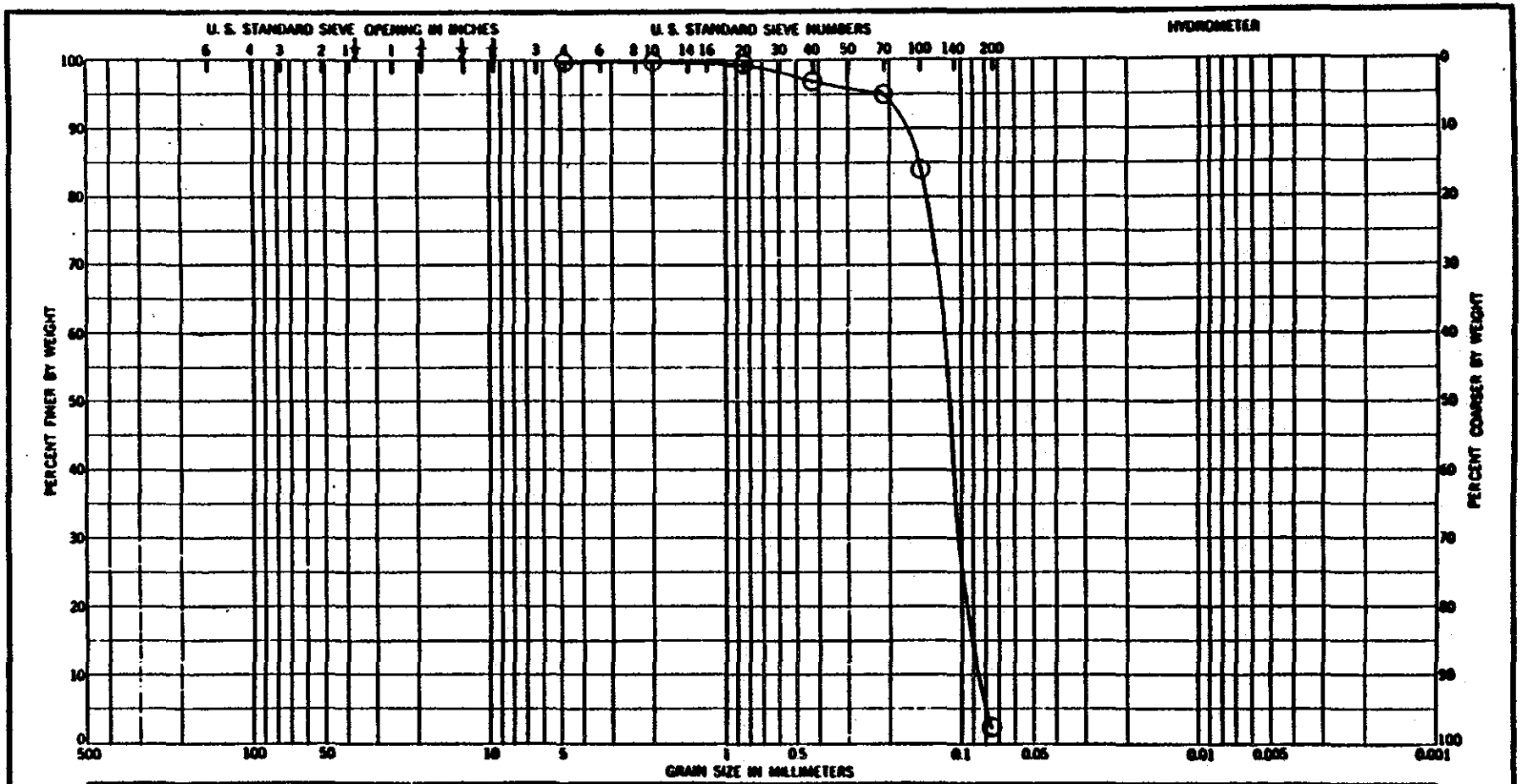
Boring No. 100 - 370 - 7

Date 1/25/84

ENG FORM 1 MAY 63 2087

GPO 926-280

FIGURE 2-4G



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
H	Surface	Dark gray - fine sand (SP)				
		w/marine odor				
		Sp. Gr. = 2.68				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: H

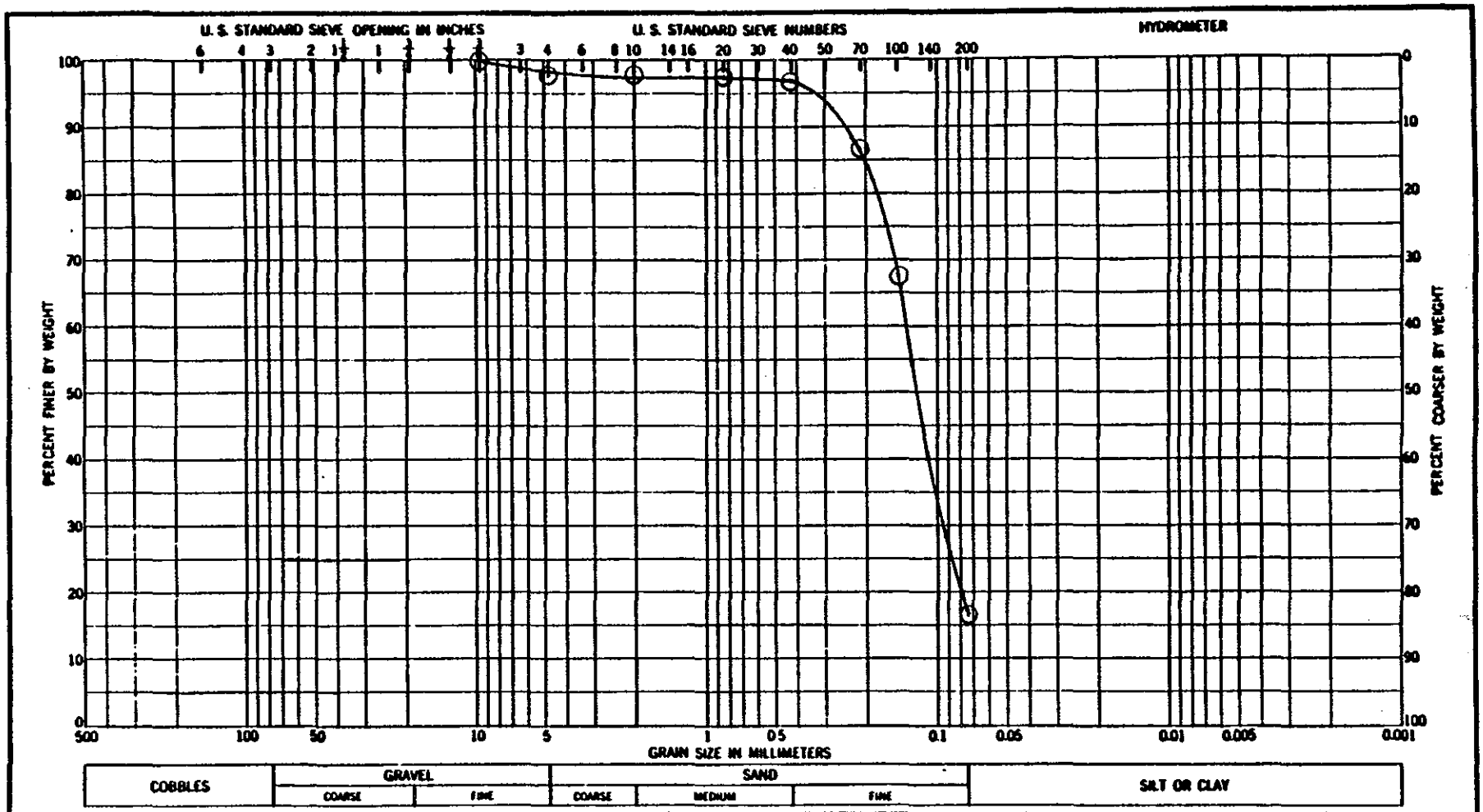
Boring No.: 100 - 370 - 83

Date: 12/16/83

ENG FORM 1 MAY 83 2087

GPO 926-280

FIGURE 2-4H



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
I	Surface	Dark gray - silty fine sand (SM) w/shell fragments and marine odor				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: I

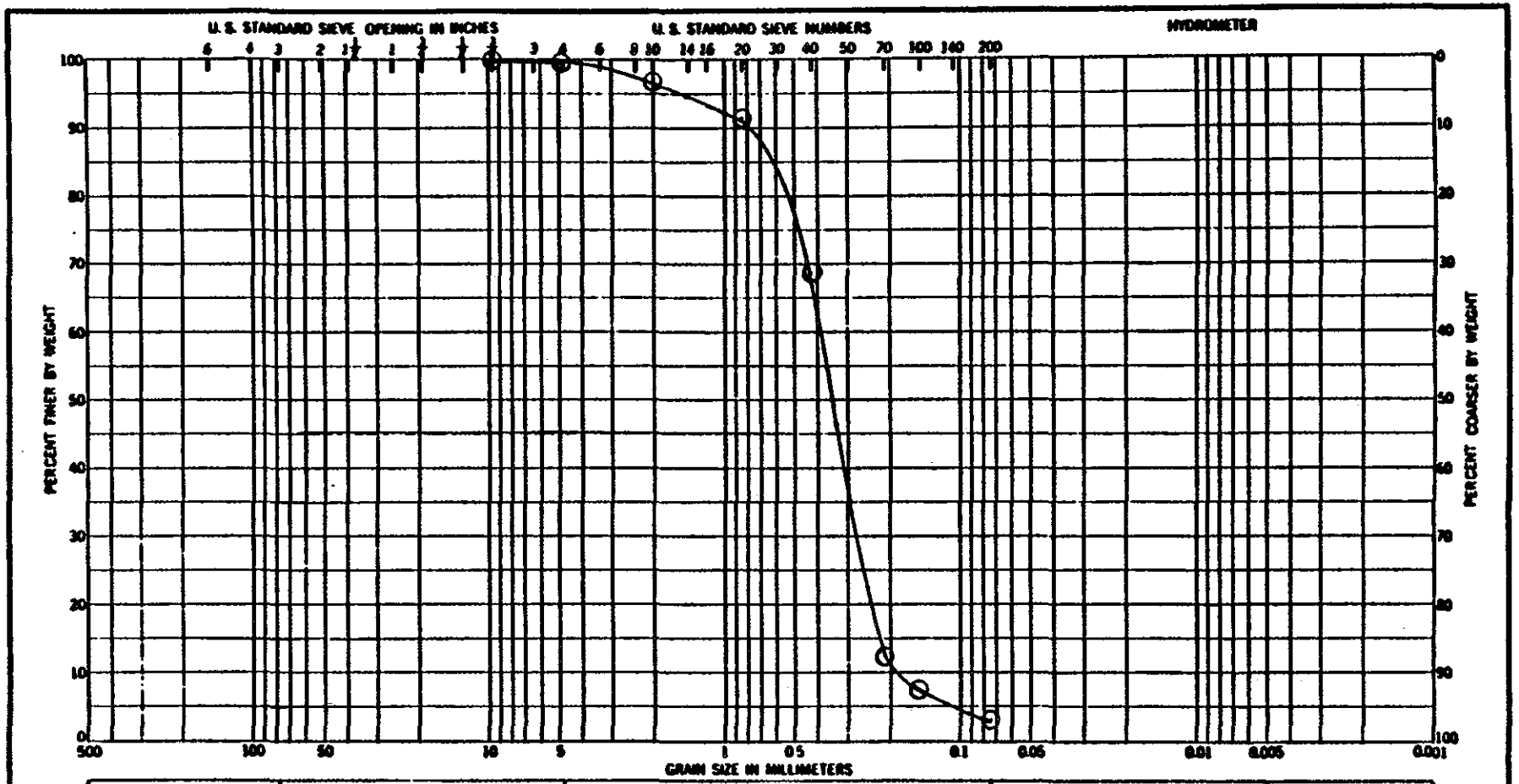
Boring No.: 100 - 370 - 9

Date: 1/25/84

ENG FORM 1 MAY 63 2087

GPO 826-280

FIGURE 2-4I



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
J	Surface	Brown - medium fine sand (SP) w/shell fragments and marine odor				
		Sp. Gr. = 2.67				

GRADATION CURVES

Project: BIDDEFORD POOL, MAINE

Area: J

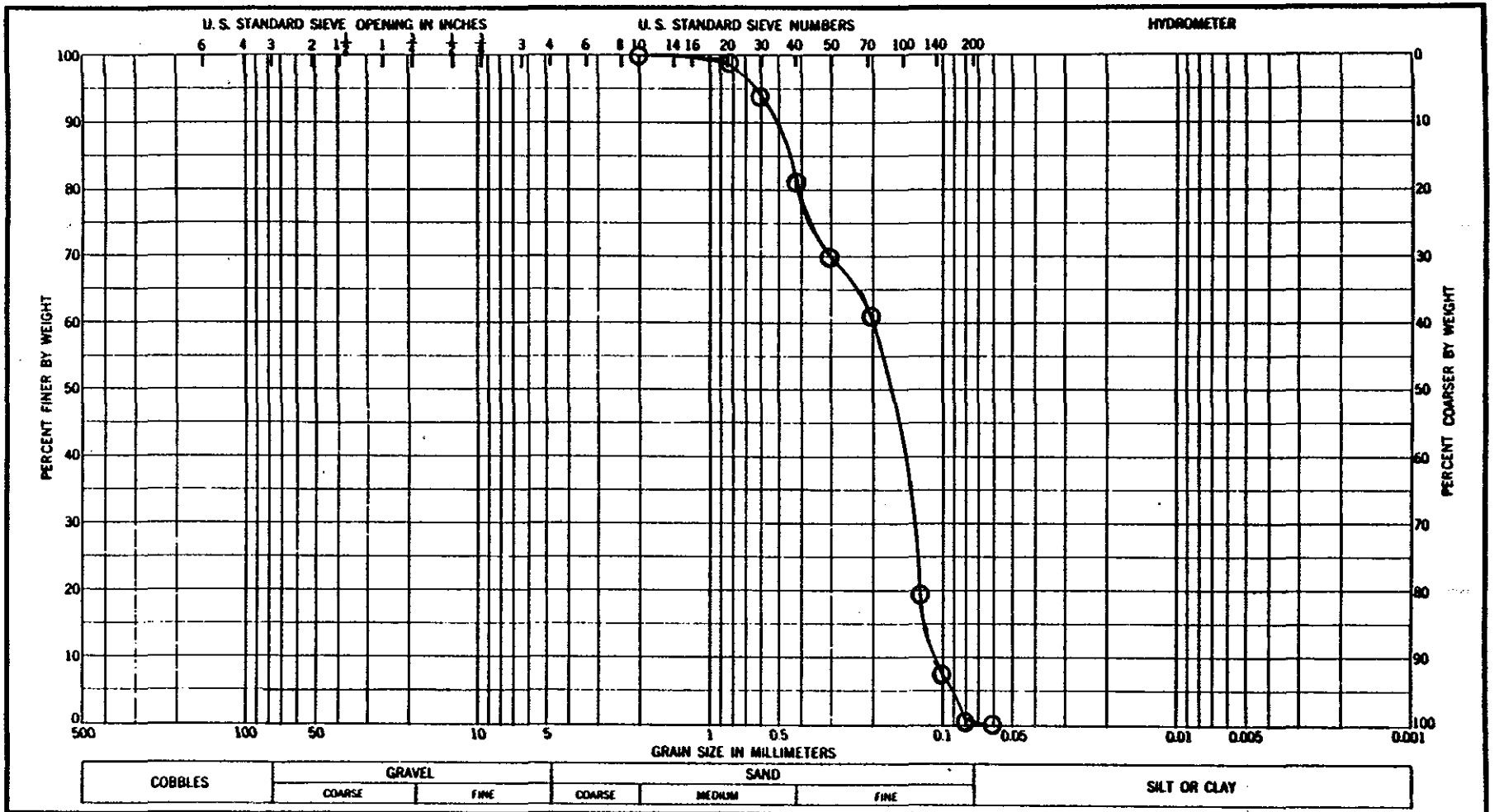
Boring No.: 100 - 370 - 10

Date: 12/16/83

ENG FORM 1 MAY 83 2087

GPO 926-260

FIGURE 2-4J



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
A-LW (low water)		Poorly graded medium and fine sand, mostly fine sand (SP)				

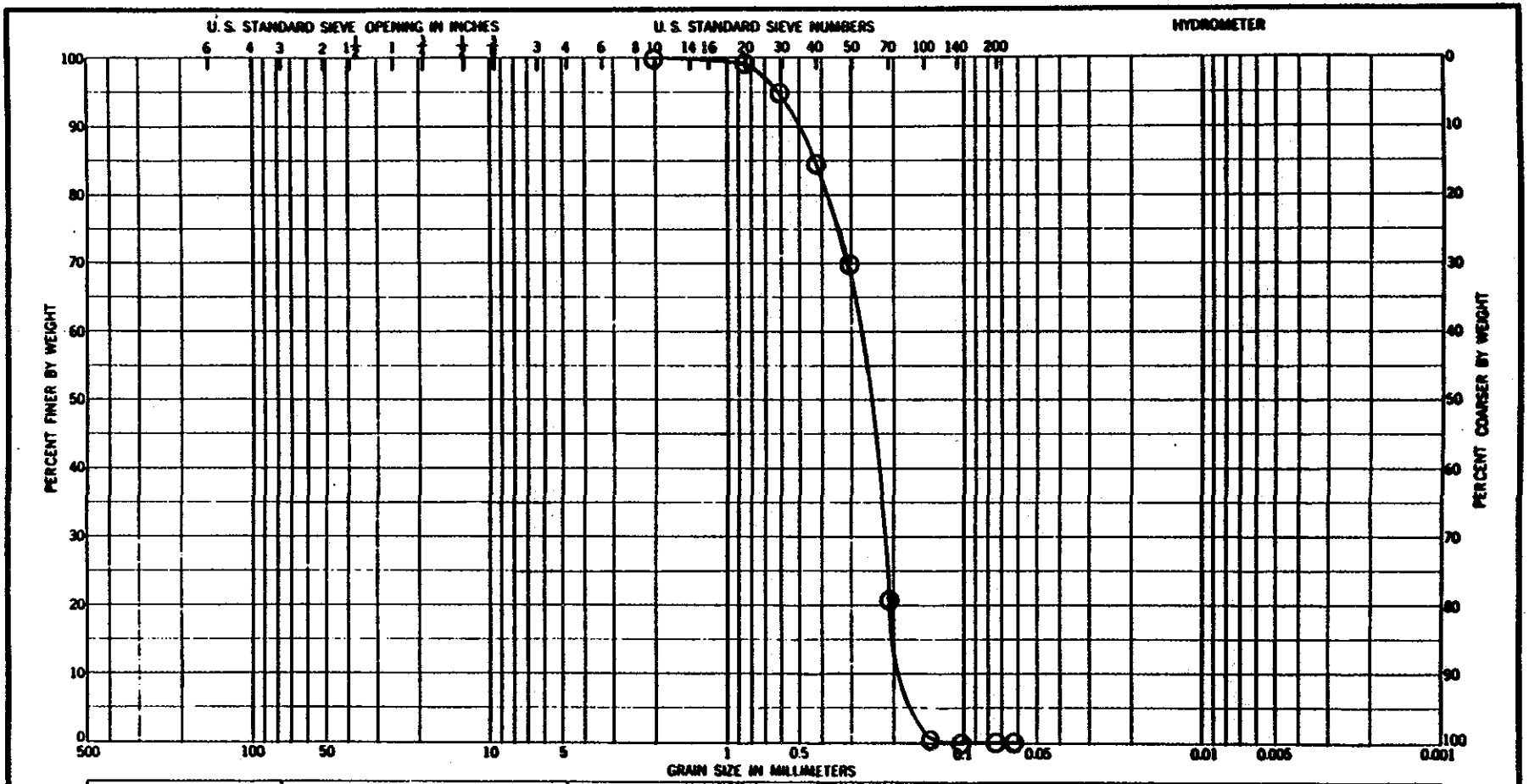
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (A-LW)
Boring No.: 100 - 416 - 1
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 826-250

FIGURE 2-5A



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
A-MD (mid-depth)		Poorly graded medium and fine sand, mostly fine sand (SP)				
		Sp. Gr. = 2.66				

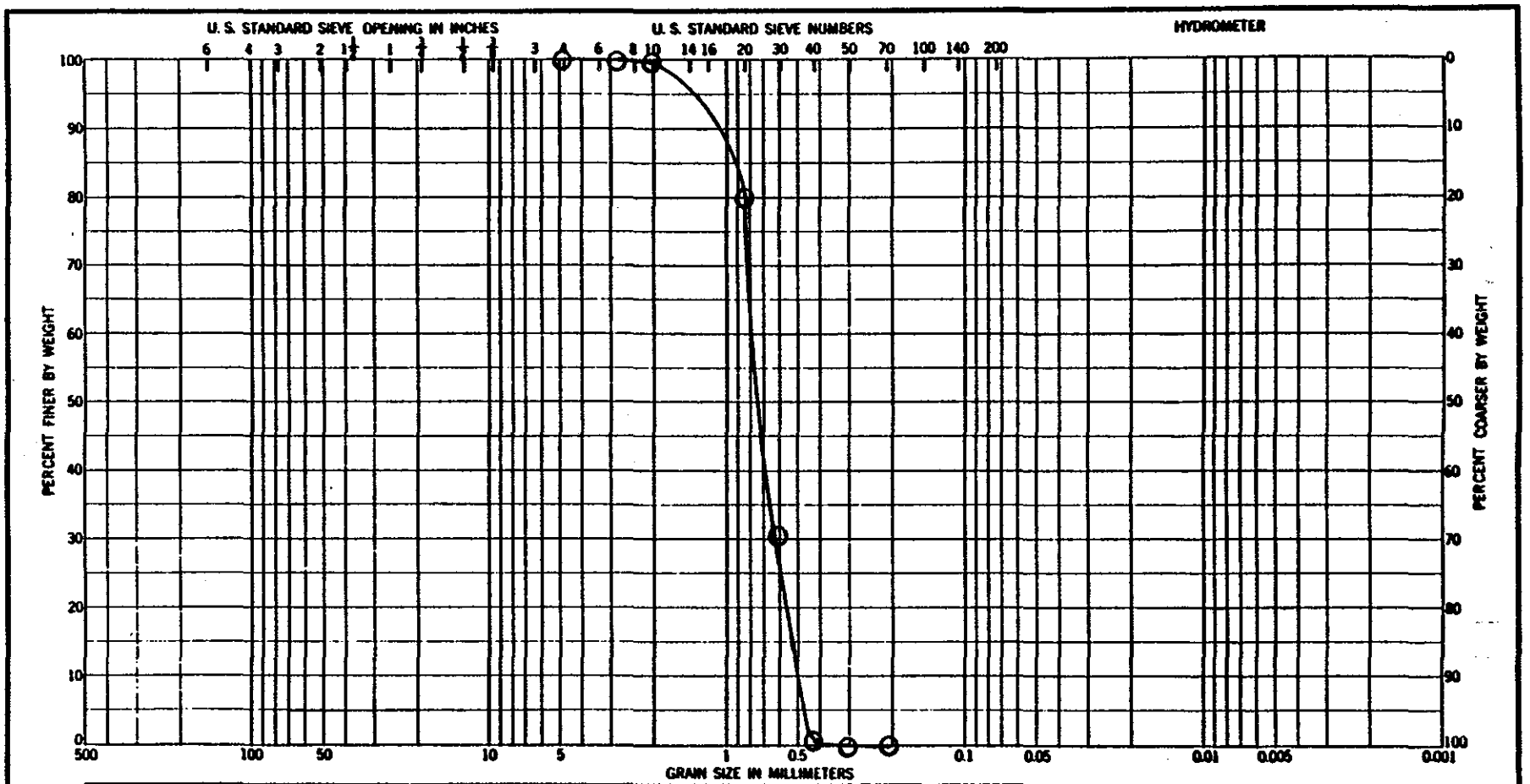
GRADATION CURVES

Project WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area HILLS BEACH (A-MD)
Boring No. 100 - 416 - 2
Date 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-280

FIGURE 2-5B



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
A-HW (high-water)		Poorly graded medium sand (SP)				

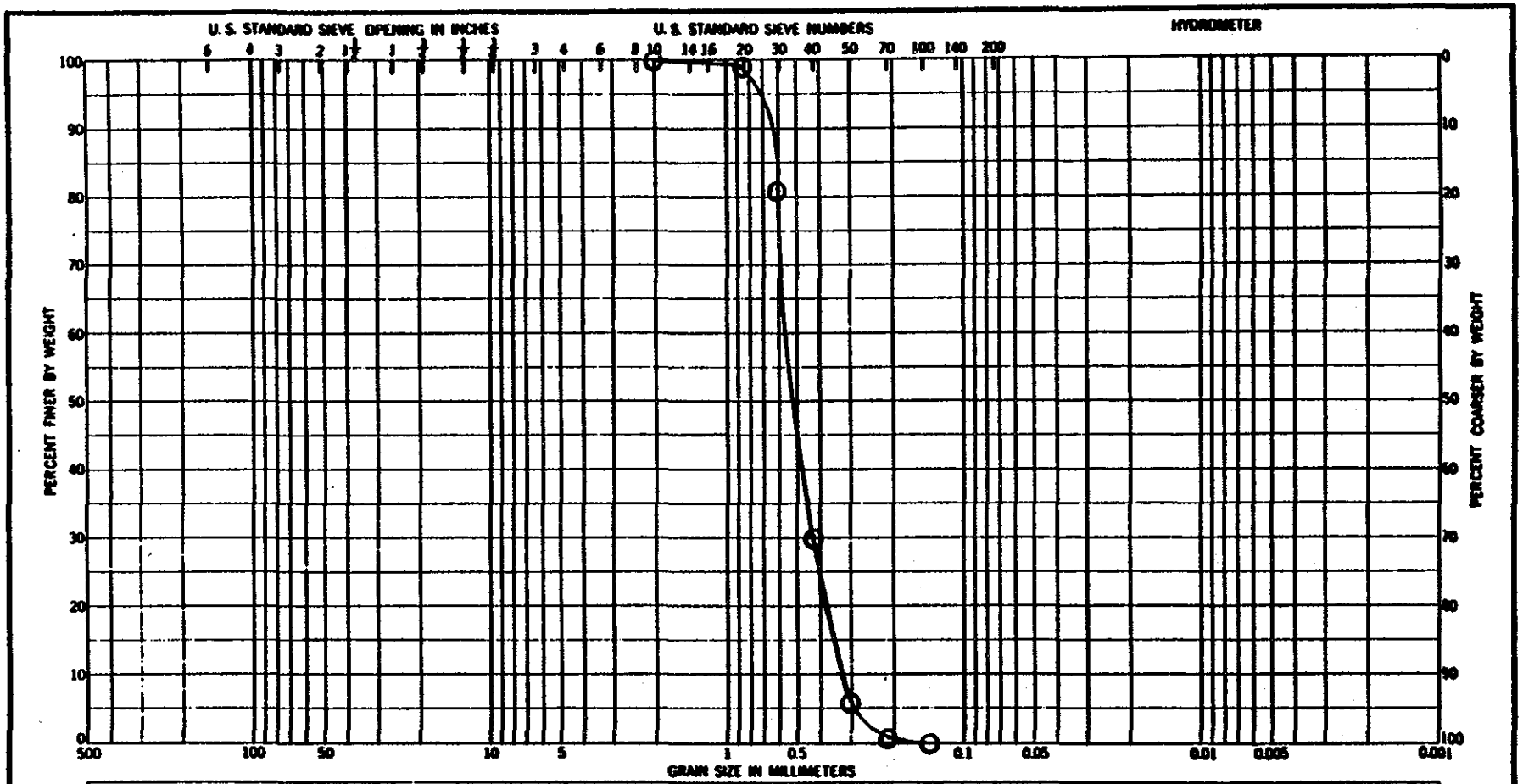
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (A-HW)
Boring No.: 100 - 416 - 3
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-280

FIGURE 2-5C



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
A-DL (dune-line)		Poorly graded medium and fine sand, mostly medium sand (SP)				

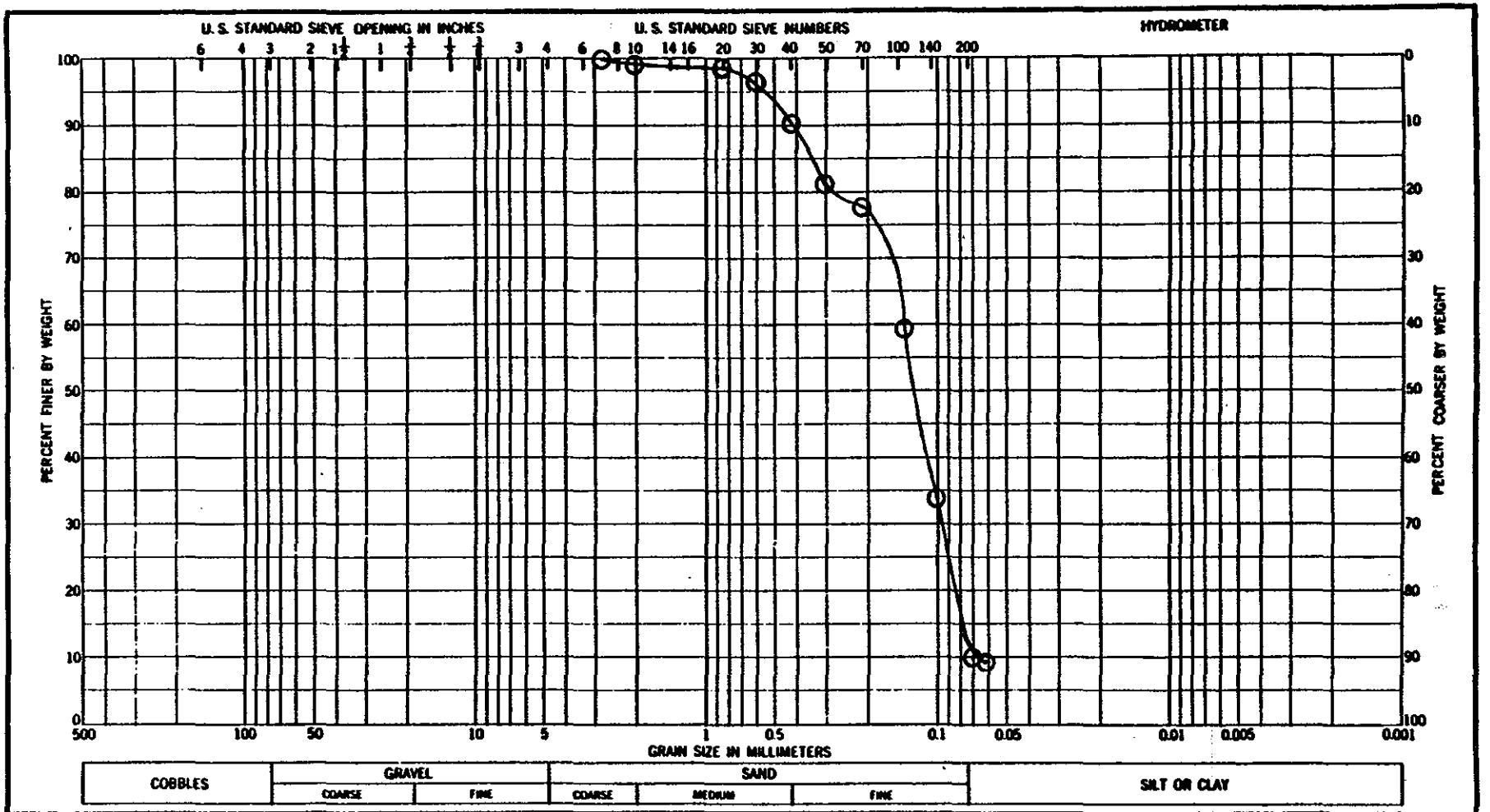
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (A-DL)
Boring No.: 100 - 416 - 4
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-250

FIGURE 2-5D



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-LW (low-water)		Poorly graded coarse to fine sand, mostly fine sand with 11% fines (SP)				

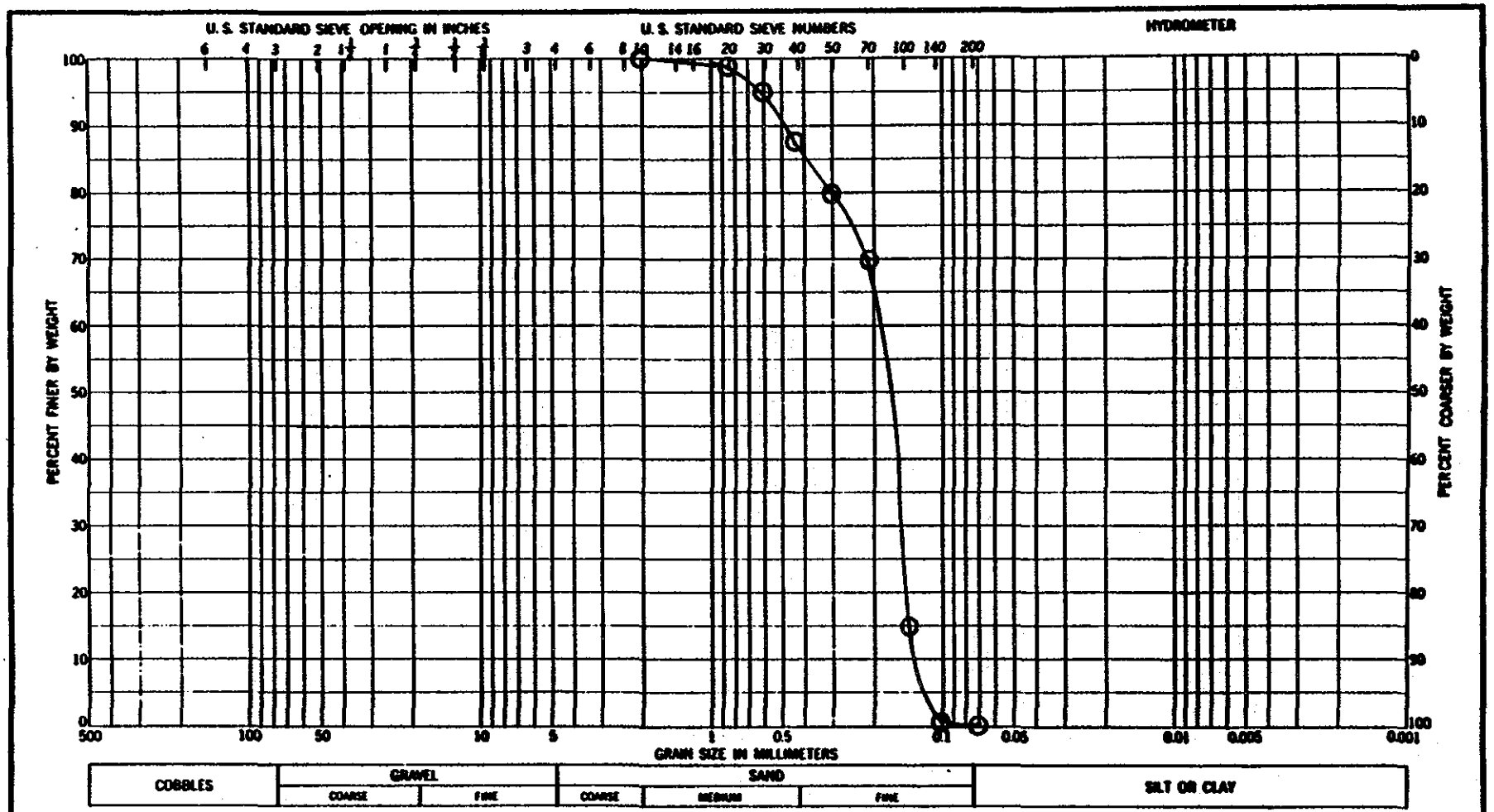
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (B-LW)
Boring No.: 100 - 416 - 5
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-250

FIGURE 2-5E



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-MD (mid-depth)		Poorly graded medium and fine sand, mostly fine sand (SP)				
		Sp. Gr. = 2.67				

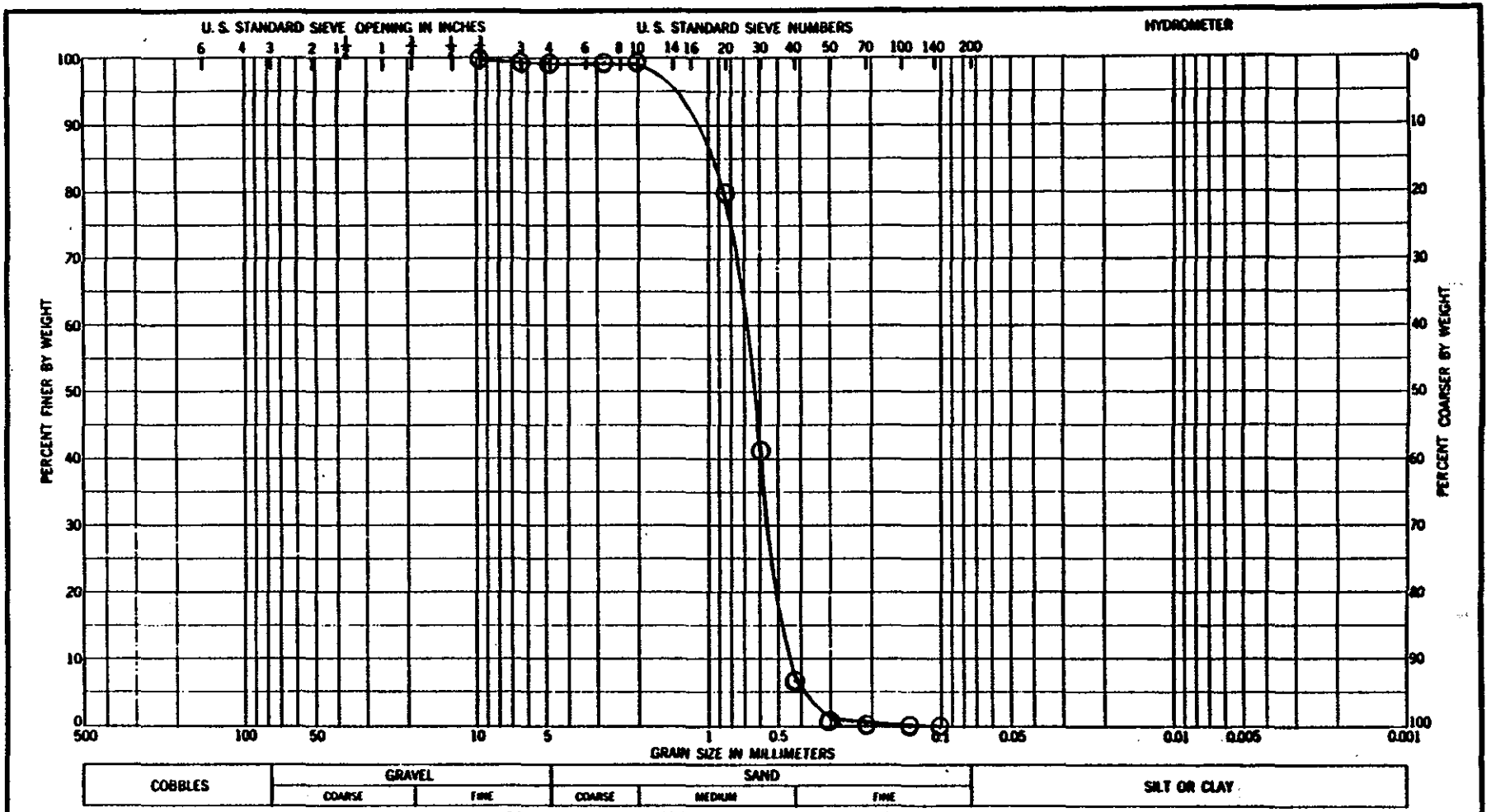
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (B-MD)
Boring No.: 100 - 416 - 6
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-280

FIGURE 2-5F



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-HW (high-water)		Poorly graded coarse to fine sand, mostly medium sand (SP)				

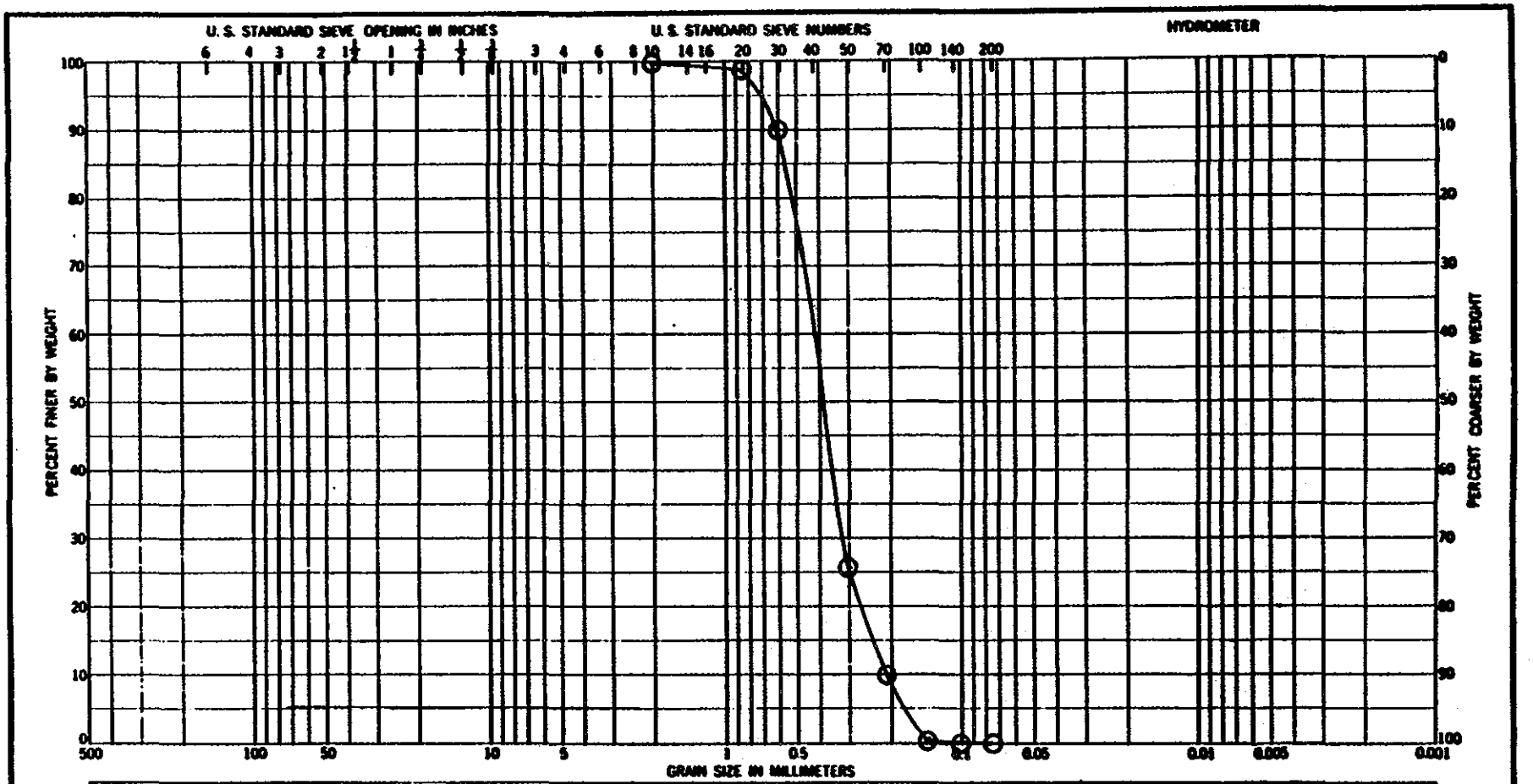
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (B-HW)
Boring No.: 100 - 416 - 7
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-260

FIGURE 2-5G



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-DL (dune-line)		Poorly graded medium and fine sand (SP)				

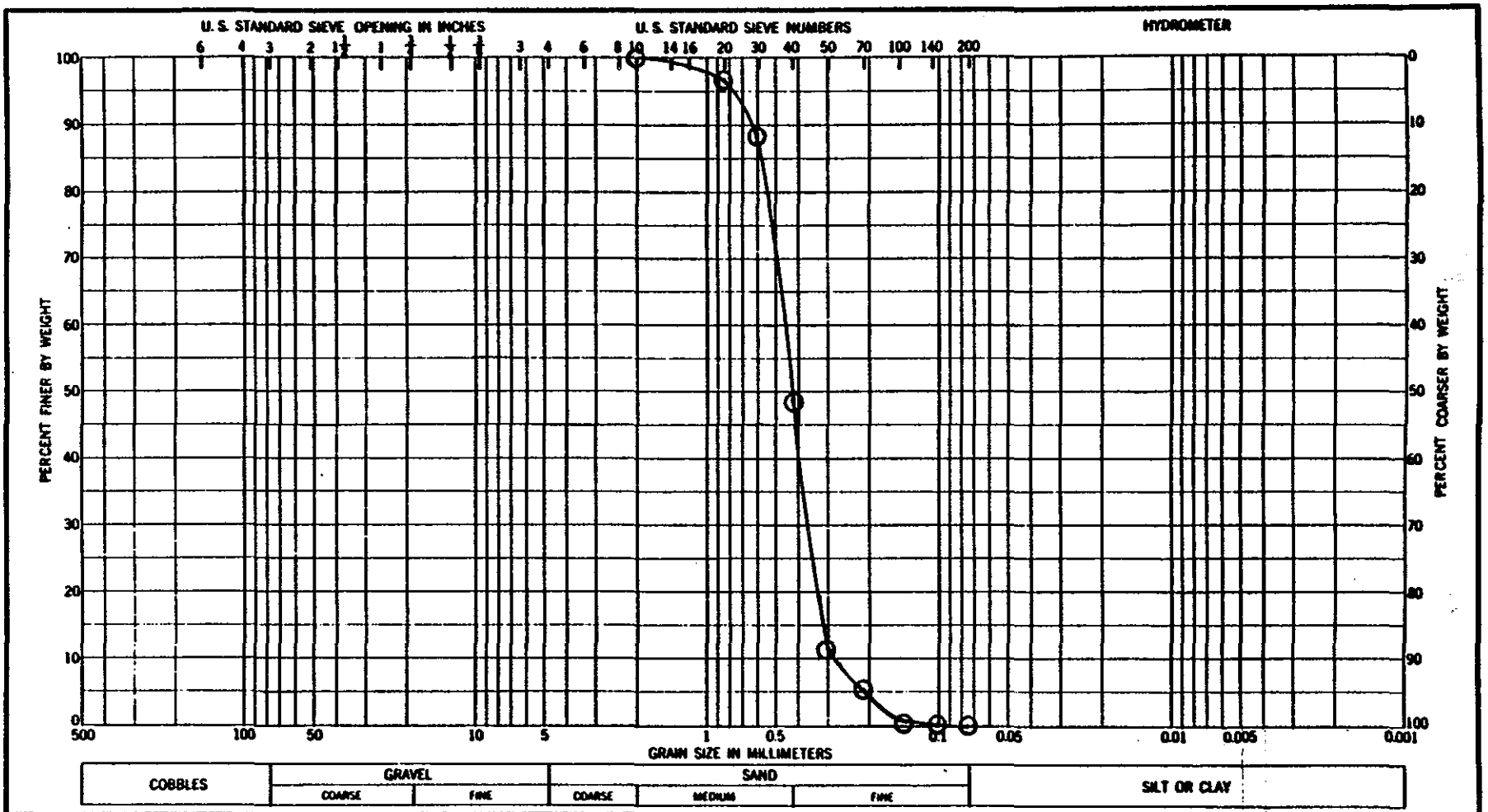
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (B-DL)
Boring No.: 100 - 416 - 8
Date: 8/19/85

ENG FORM 2087 MAY 63

GPO 826-250

FIGURE 2-5H



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
C-LW (low-water)		Poorly graded medium and fine sand (SP)				

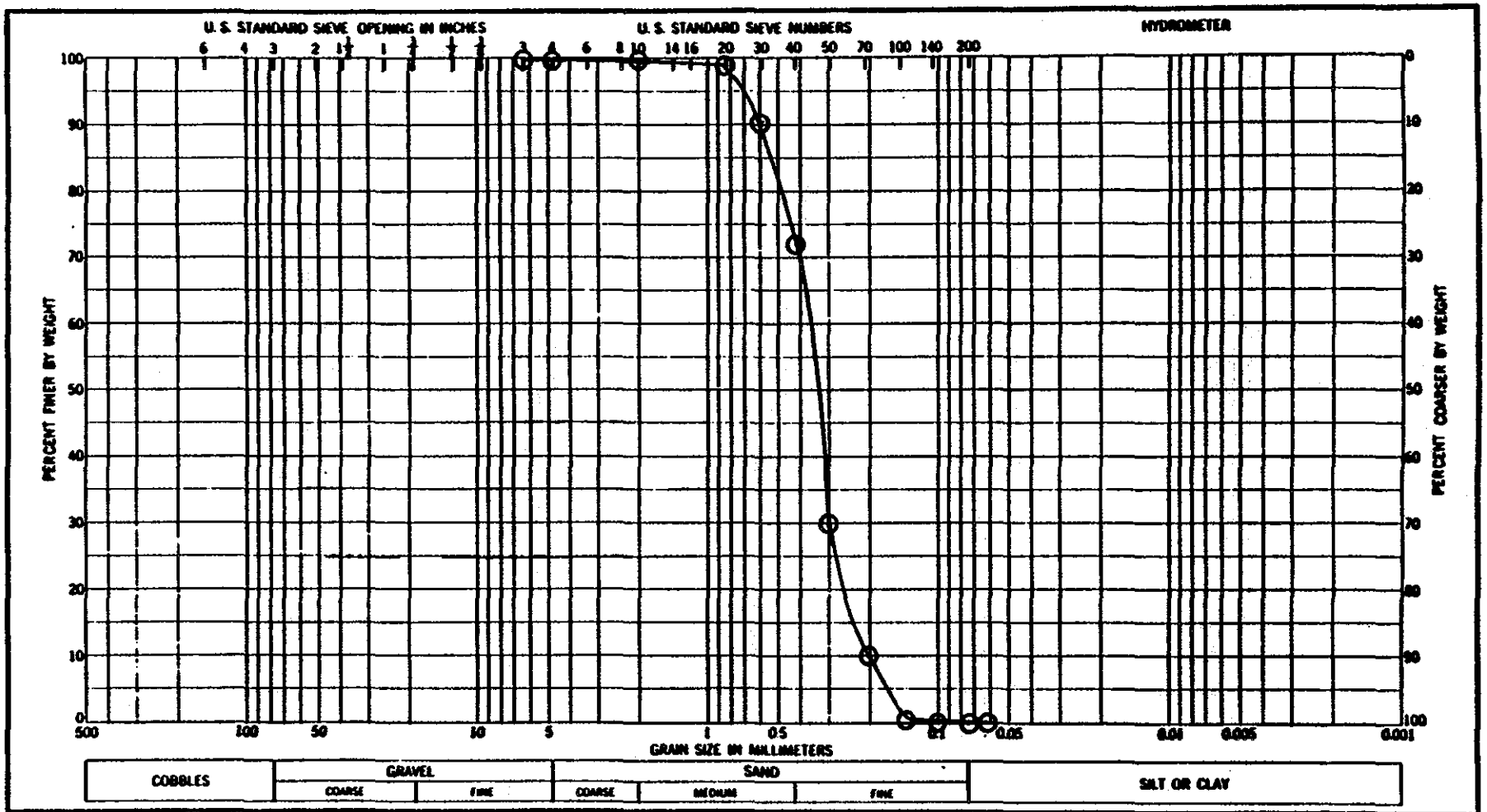
GRADATION CURVES

Project	WOOD ISLAND HARBOR
	BIDDEFORD, MAINE
Area	HILLS BEACH (C-LW)
Boring No.	100 - 416 - 9
Date	8/19/85

ENG FORM 1 MAY 63 2087

GPO 826-280

FIGURE 2-5I



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
C-MD (mid-depth)		Poorly graded medium and fine sand, mostly fine sand (SP)				
		Sp. Gr. = 2.65				

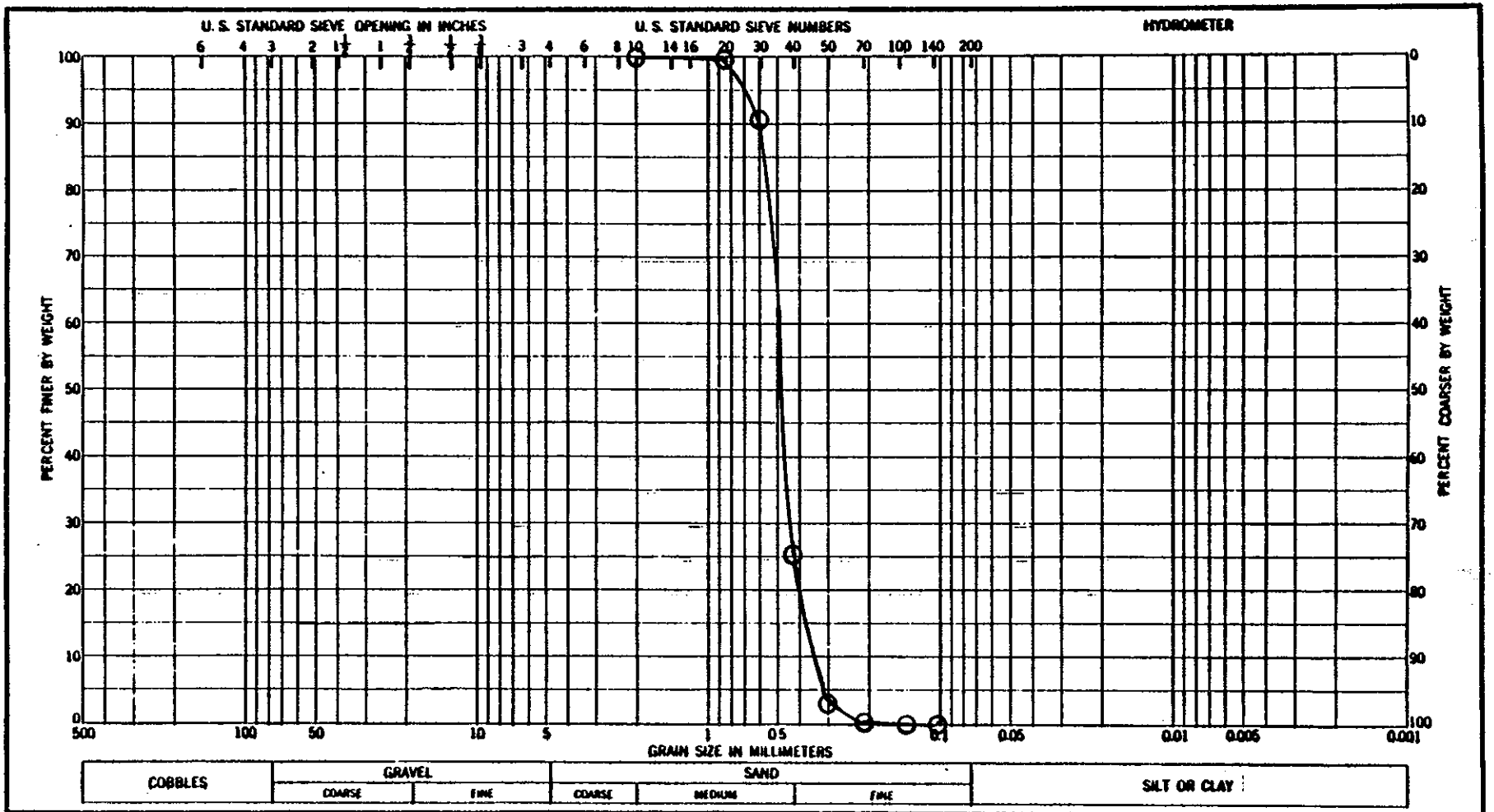
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (C-MD)
Boring No.: 100 - 416 - 10
Date: 8/19/85

ENG FORM V 63 2087

GPO 926-280

FIGURE 2-5J



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
C-HW (high-water)		Poorly graded medium and fine sand, mostly medium sand (SP)				

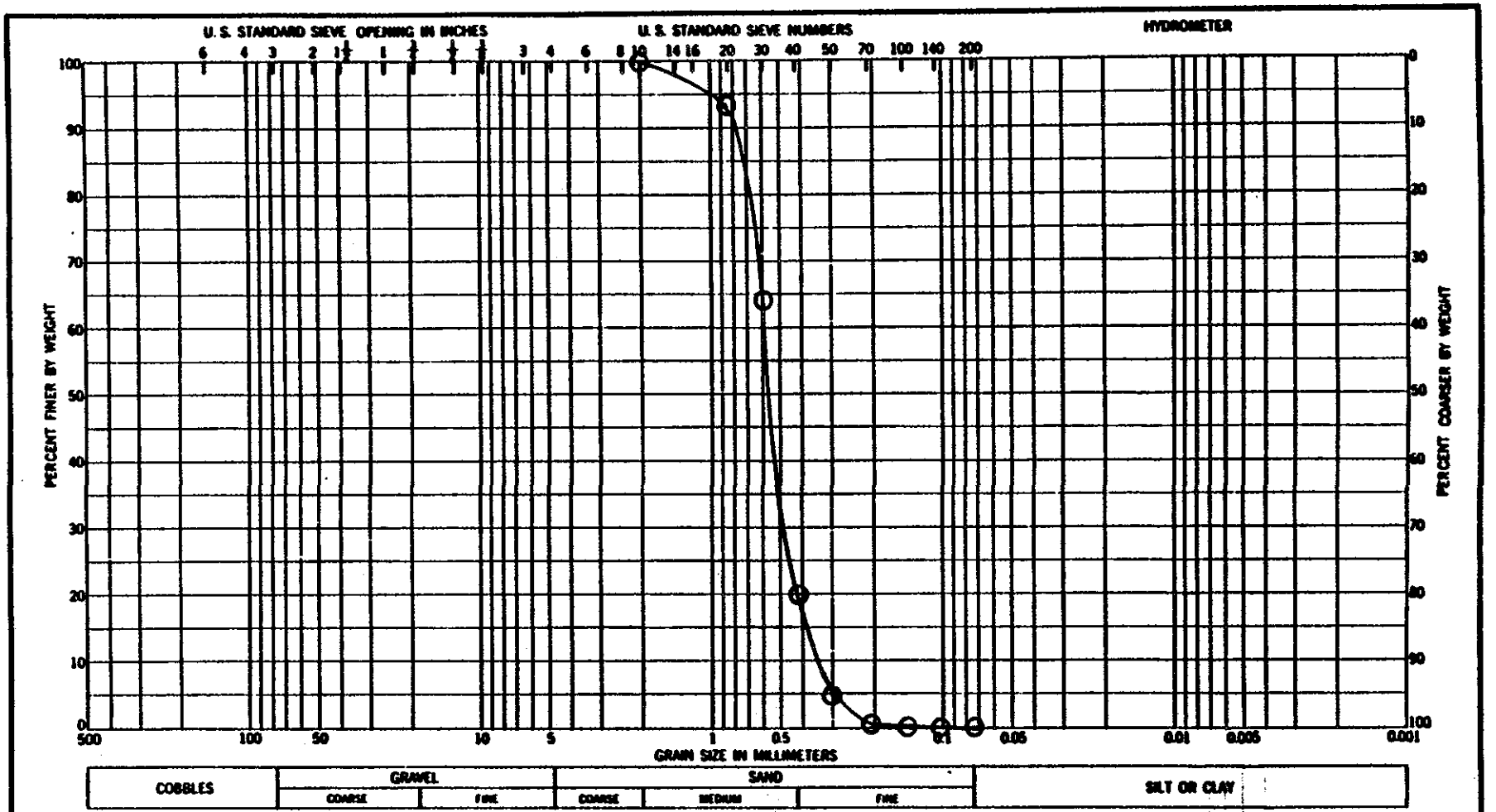
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (C-HW)
Boring No.: 100 - 416 - 11
Date: 8/19/85

ENG FORM 1 MAY 83 2087

FIGURE 2-5K

GPO 926-280



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
C-DL		Poorly graded medium and				
(dune-line)		fine sand, mostly medium				
		sand (SP)				

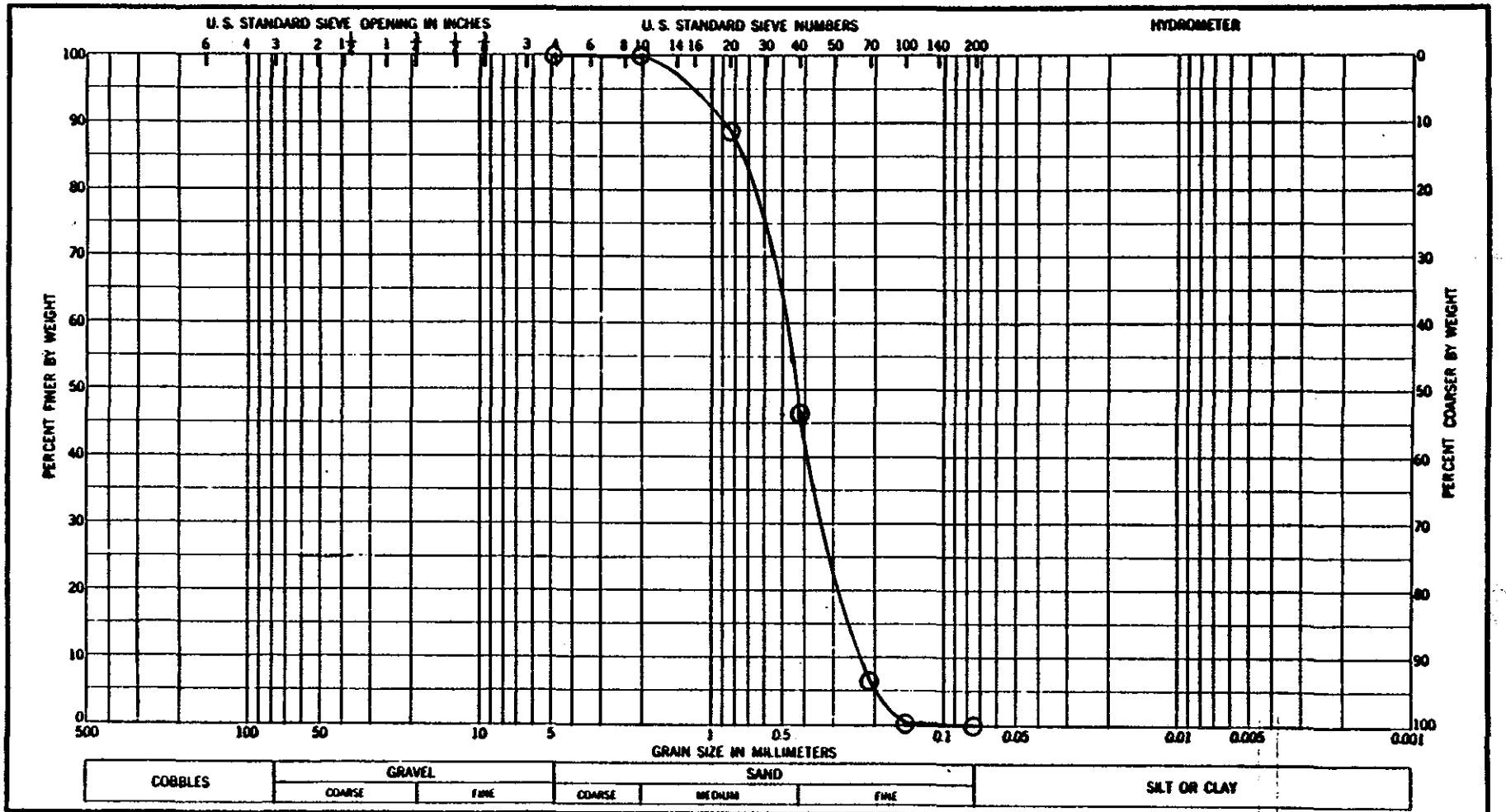
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: HILLS BEACH (C-DL)
Boring No.: 100 - 416 - 12
Date: 8/19/85

ENG FORM 1 MAY 63 2087

GPO 926-260

FIGURE 2-5L



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
1	Surface	LIGHT BROWN - POORLY GRADED SAND - MEDIUM SAND (SP)				
		Sp. Gr. = 2.64				

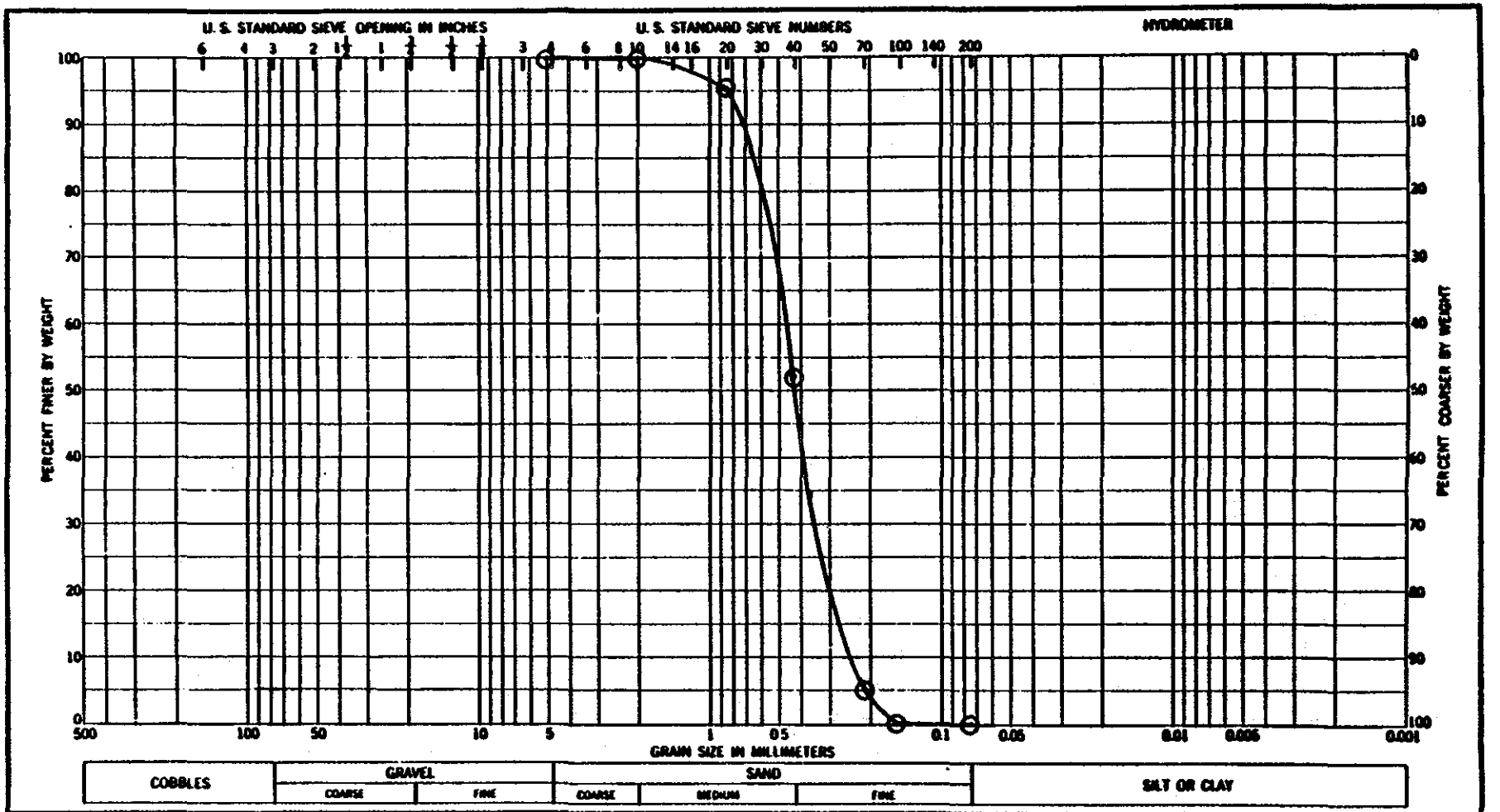
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: 1 (TOMBOLO)
Boring No.: 100 - 478 - 1
Date: 9/14/88

ENG FORM 1 MAY 63 2087

GPO 926-280

FIGURE 2-6A



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
2	SURFACE	LIGHT BROWN - POORLY GRADED SAND - MEDIUM SAND (SP)				
		Sp. Gr. = 2.64				

GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE

Area: 2 (TOMBOLO)

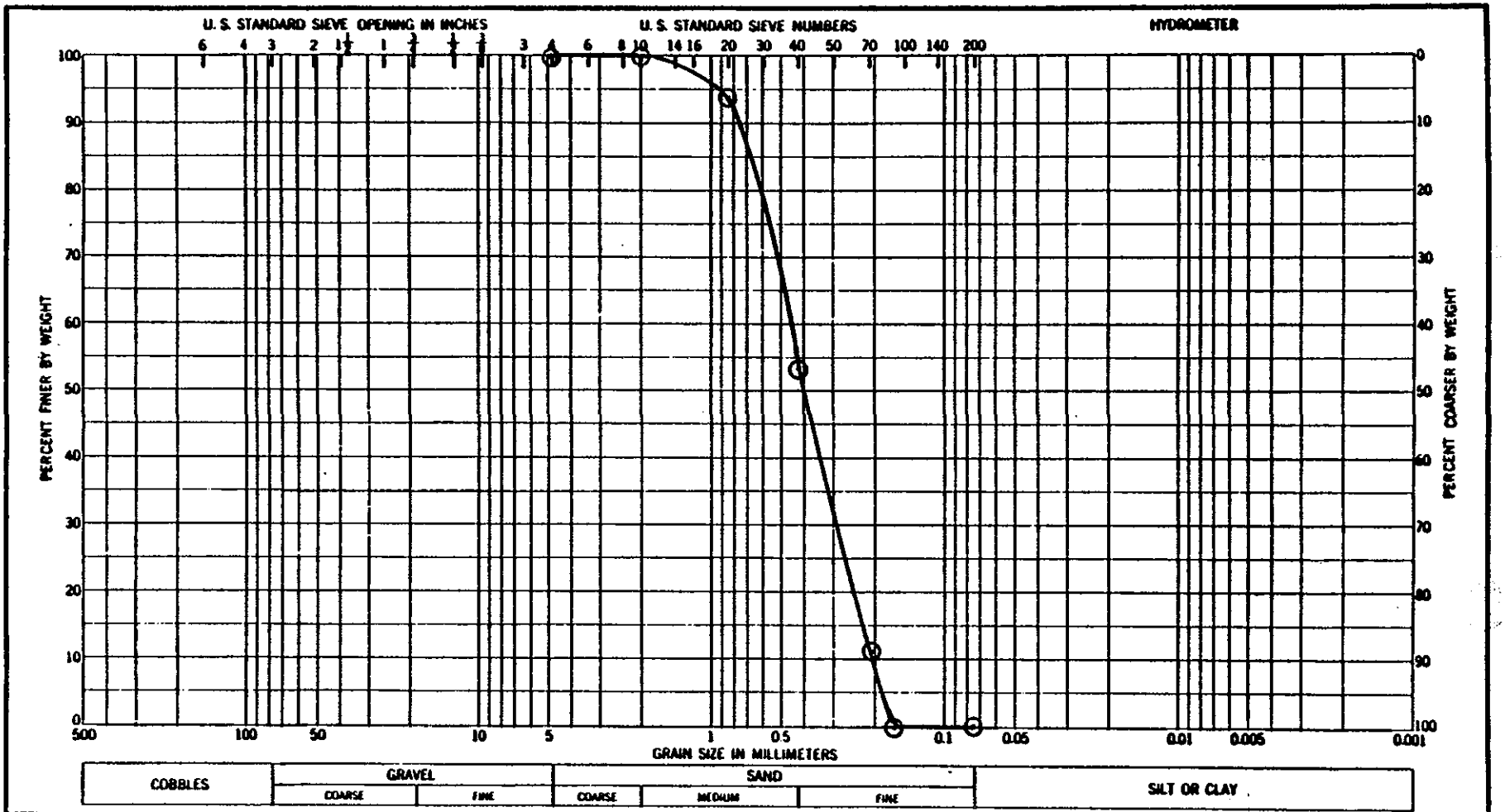
Boring No.: 100 - 478 - 2

Date: 9/14/88

ENG FORM 1 MAY 63 2087

GPO 826-280

FIGURE 2-6B



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
3	SURFACE	LIGHT BROWN - POORLY GRADED SAND - MEDIUM SAND (SP)				
		Sp. Gr. = 2.64				

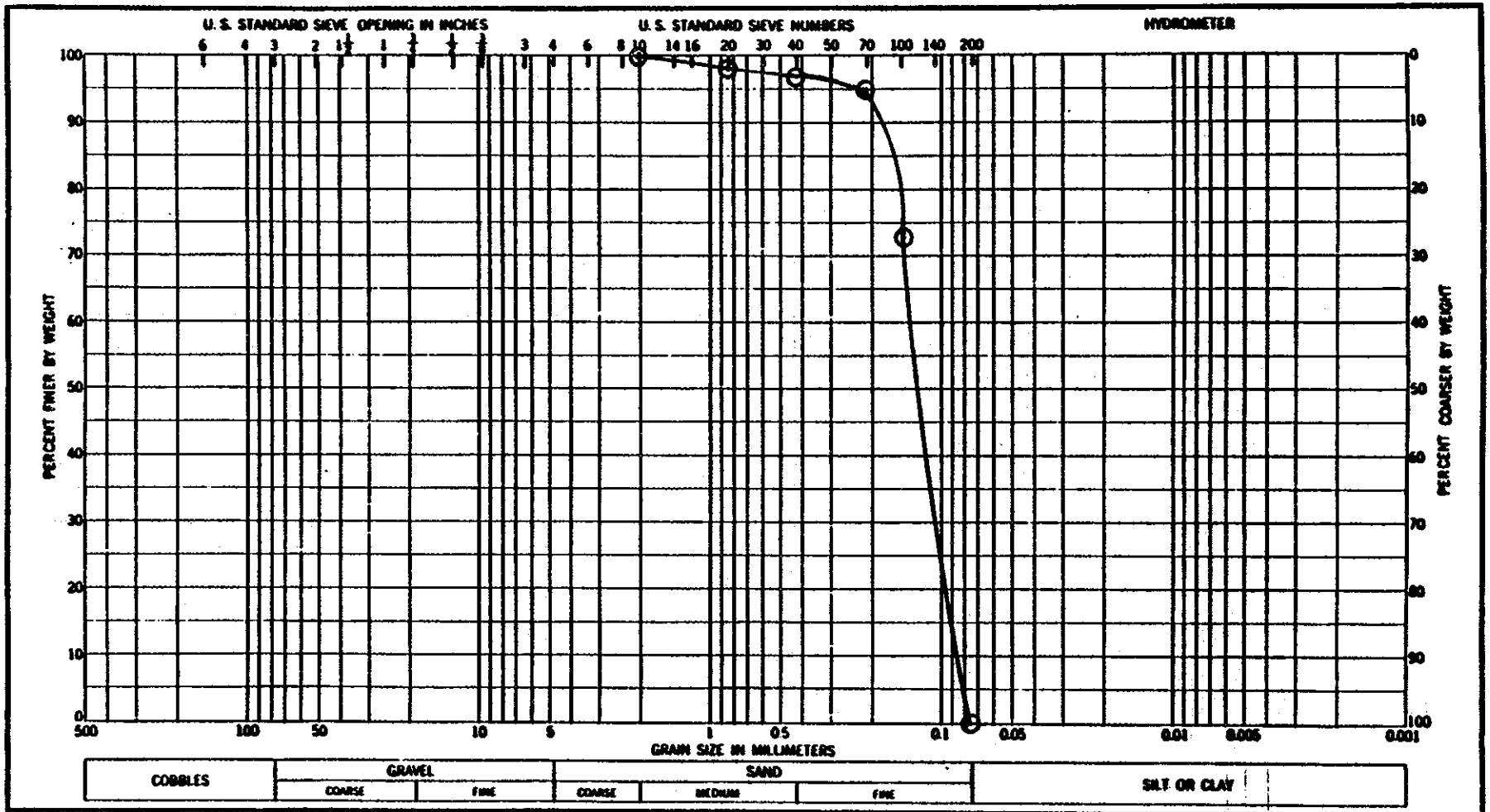
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: 3 (TOMBOLO)
Boring No.: 100 - 478 - 3
Date: 9/14/88

ENG FORM 1 MAY 63 2087

FIGURE 2-6C

GPO 926-260



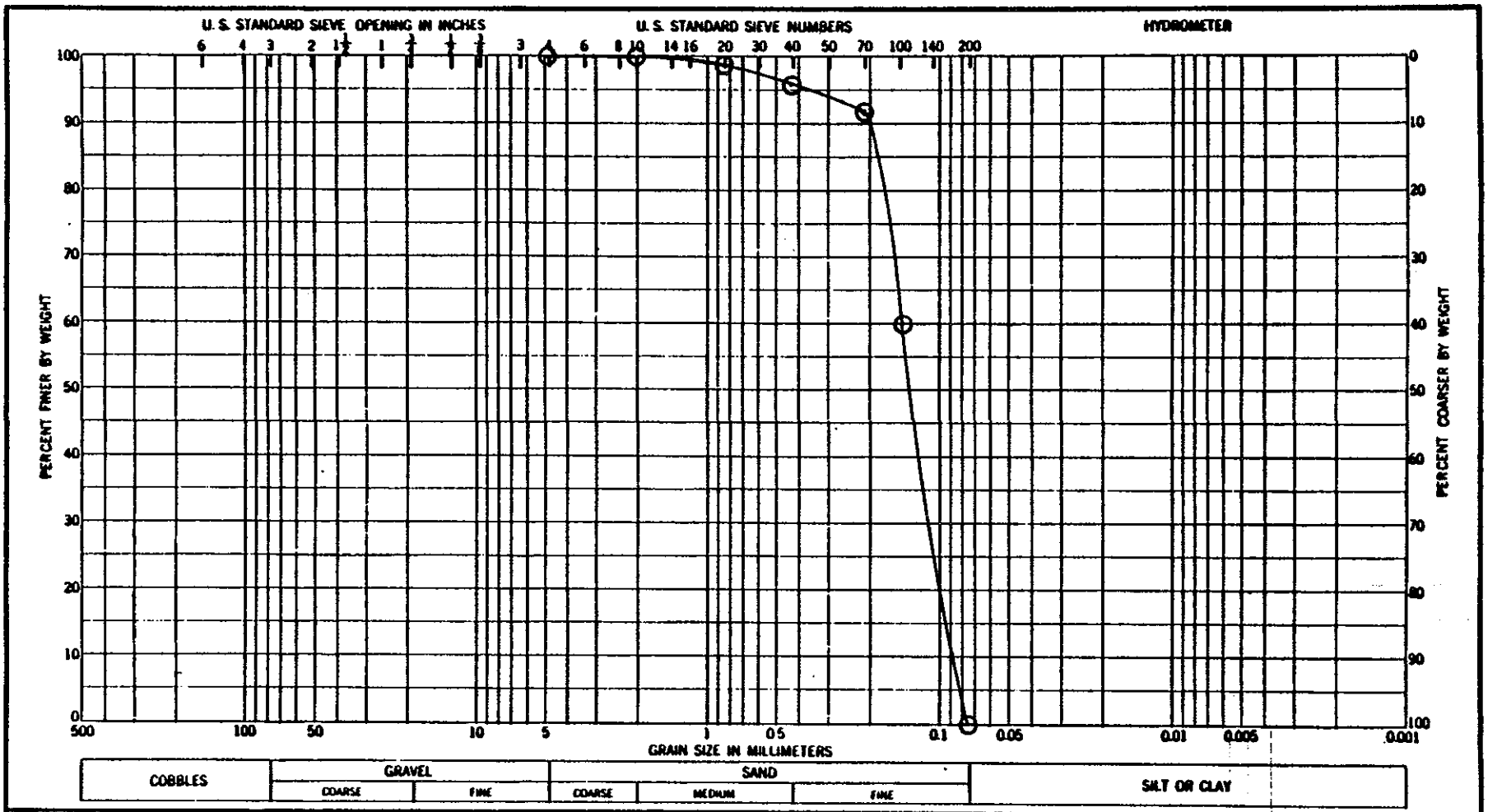
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-1		GRAY - POORLY GRADED SAND (SP)				
		Sp. Gr. = 2.68				

GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: (CHANNEL)
Boring No.: 100 - 469 - 1
Date: 12/16/87

ENG FORM 2087

FIGURE 2-7A



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-1		GRAY -- POORLY GRADED SAND (SP)				
		Sp. Gr. = 2.67				

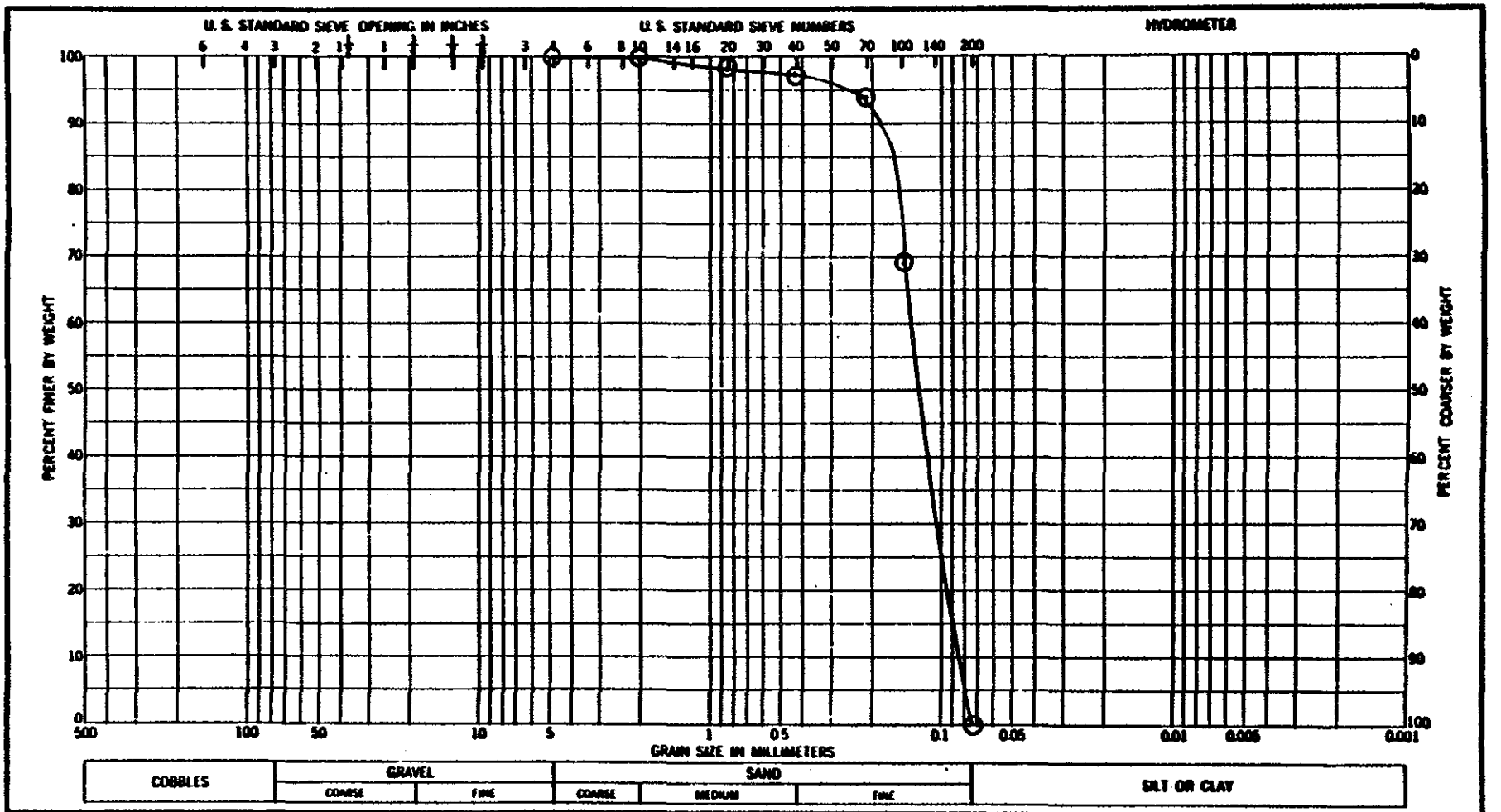
GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: (CHANNEL)
Boring No.: 100 - 469 - 2
Date: 12/16/87

ENG FORM 1 MAY 83 2087

GPO 826-280

FIGURE 2-7B



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
B-1		GRAY - POORLY GRADED SAND (SP)				
		Sp. Gr. = 2.65				

GRADATION CURVES

Project: WOOD ISLAND HARBOR
BIDDEFORD, MAINE
Area: (CHANNEL)
Boring No.: 100 - 469 - 3
Date: 12/16/87

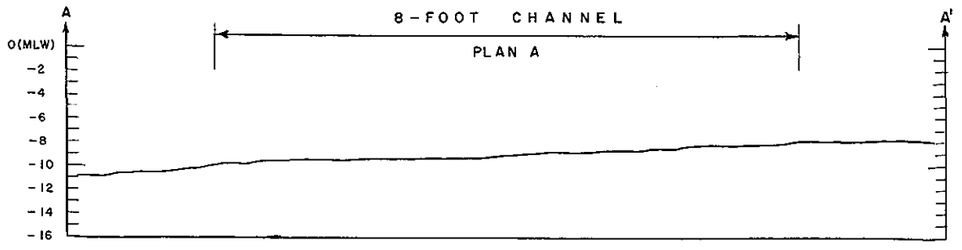
ENG FORM 1 MAY 83 2087

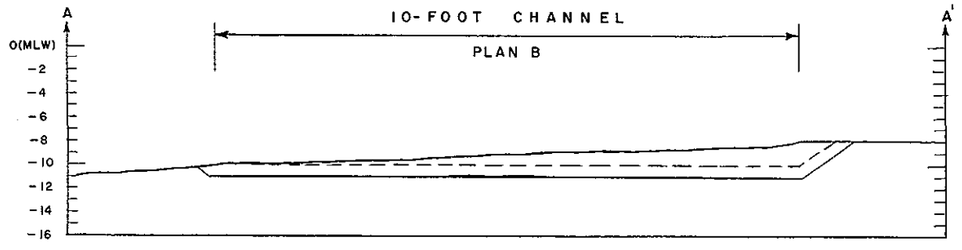
GPO 926-280

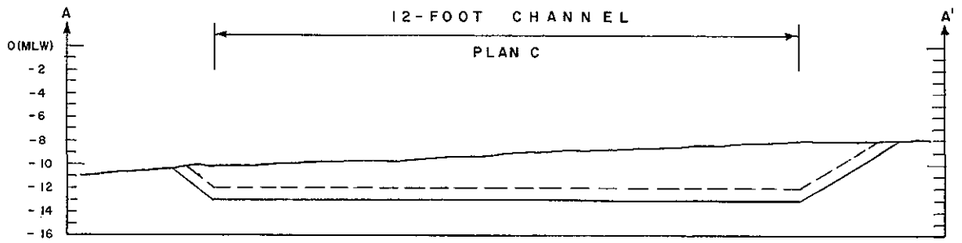
FIGURE 2-7C

CORPS OF ENGINEERS — U. S. ARMY

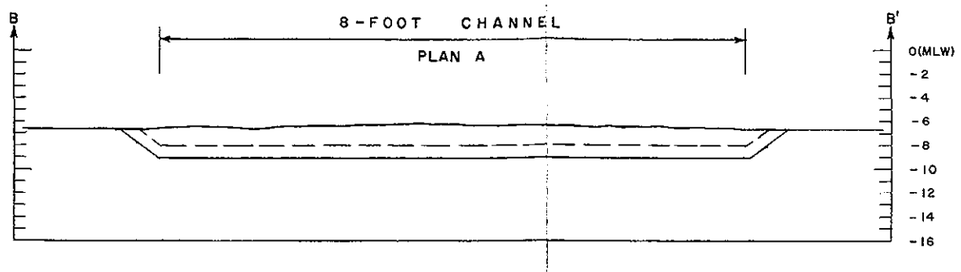
SECTION A-A'

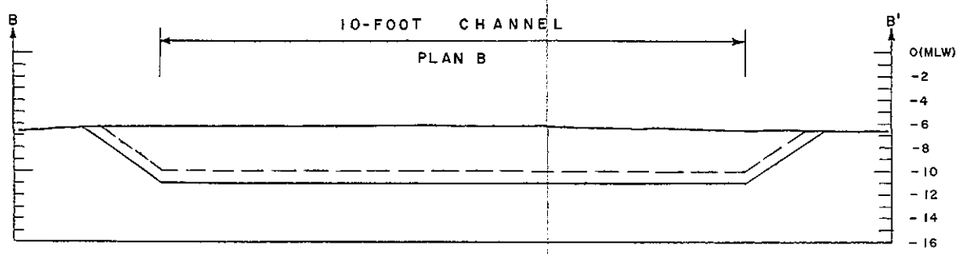


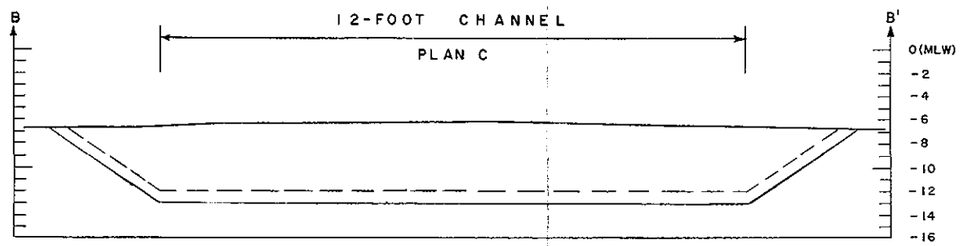




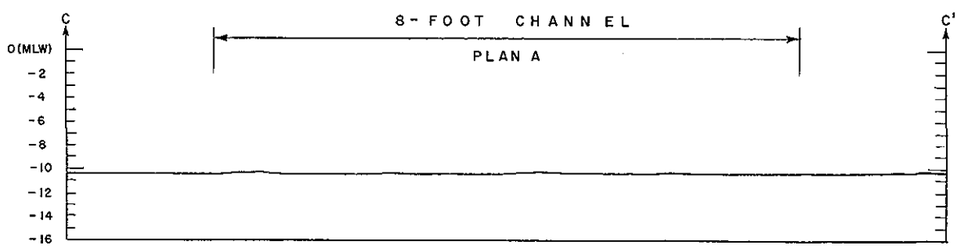
SECTION B-B'

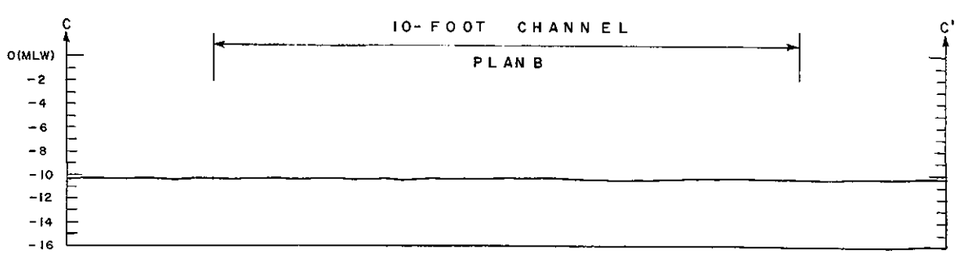






SECTION C-C'





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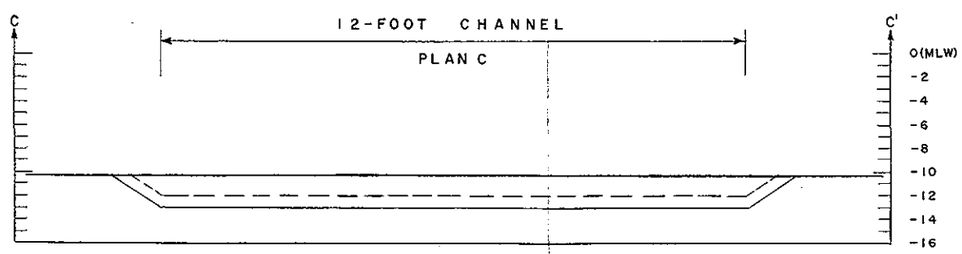


NOTES:
SIDESLOPES ARE ASSUMED TO BE 1ON 3 IN ORDINARY MATERIAL.
OVERDEPTH IS ONE FOOT IN ORDINARY MATERIAL.

SEE FIGURE 2-9

SAFETY PAYS

GRAPHIC SCALES
VER. 1"=5' 5' 0 5' 10'
HOR. 1"=10' 10' 0 10' 20'

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES IMPROVEMENT STUDY

WOOD ISLAND HARBOR, MAINE AND THE POOL AT BIDDEFORD

TYPICAL CROSS SECTIONS

SHEET 1 OF 1 | FIGURE 2-8

CORPS OF ENGINEERS

U. S. ARMY

A B C D E F G H

1 2 3 4 5 6 7 8

N224000 E446000 N226000 E448000

E 446000 E 450000 E 452000 N 222000 N 224000 N 226000 E 448000

WINKY (USE)

BASKET

FRENCH (60)

HILLS BEACH

THE POOL

EXISTING 6 FT. BASIN

FORT HILL

Flood

Ebb

A A B B C C

RED DAYMARKER

ROCK, Uncovers at M. L.W.

WAITE 2 (86)

WALL (86)

WHARF (USED BY THE COAST GUARD)

FISHERMAN WHARF

PIN

TANK

FLETCHER NECK

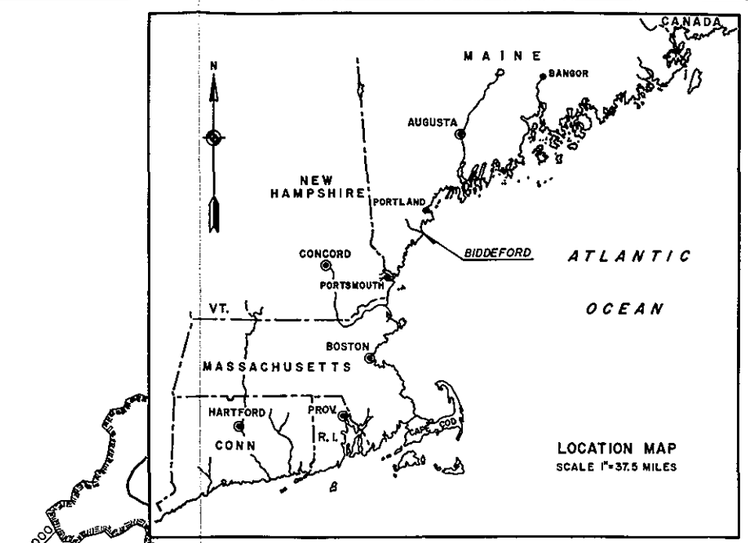
WOOD ISLAND HARBOR

PLAN

SCALE 1"=200'

———— INDICATES EXISTING PROJECT LIMITS

— — — INDICATES AREAS OF IMPROVEMENT



NOTE:

SOUNDINGS FOR TYPICAL CROSS SECTIONS TAKEN FROM FIGURE 2-1A.

200' 0 200' 400'

1"=200FT.

SAFETY PAYS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES IMPROVEMENT STUDY

WOOD ISLAND HARBOR, MAINE
AND THE POOL AT BIDDEFORD

LOCATION OF TYPICAL CROSS SECTIONS

SHEET 1 OF 1 | FIGURE 2-9

BIDDEFORD POOL, ME. SHEET 1 OF 1

CORPS OF ENGINEERS — U. S. ARMY

A B C D E F G H

N224000 N226000 E448000 E450000 E452000

1 2 3 4 5 6 7 8

FRENCH (60)

WINKY (USE)

BASKET

HILLS BEACH

THE POOL

EXISTING 6 FT. BASIN

FORT HILL

WAITE 2 (86)

WALL (86)

WHARF (USED BY THE COAST GUARD)

FISHERMAN WHARF

PIN

RED DAYMARKER

ROCK, Uncovers at M.L.W.

TANK

FLETCHER NECK

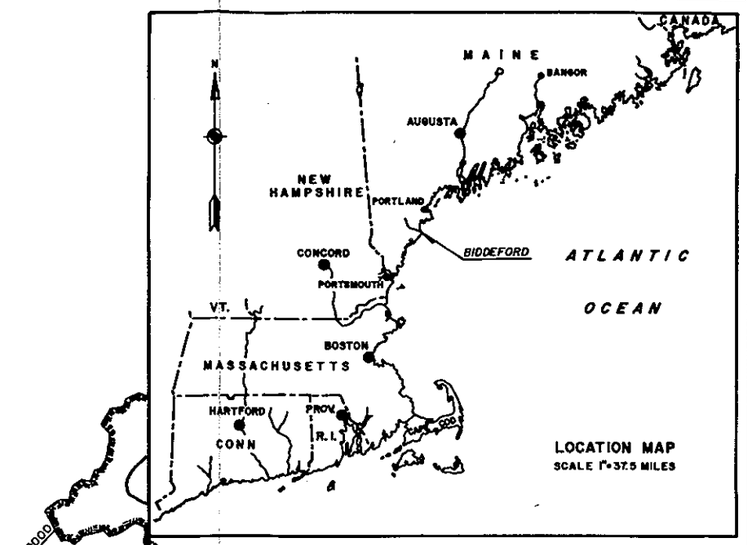
WOOD ISLAND HARBOR

PLAN

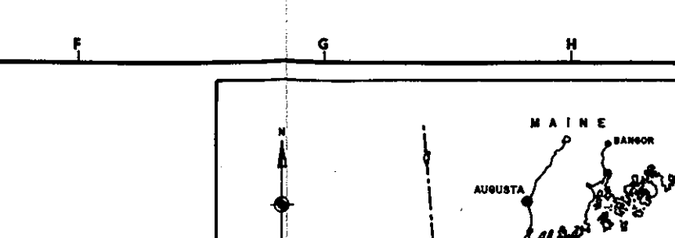
SCALE 1" = 200'

INDICATES EXISTING PROJECT LIMITS

INDICATES AREAS OF IMPROVEMENT



LIMITS OF PROPOSED DREDGING



DREDGED MATERIAL (CUBIC YARDS)

PLAN	DEPTH AT M.L.W.	ROCK	ORDINARY
A	- 8 FEET	0	5,250
B	- 10 FEET	0	16,000
C	- 12 FEET	0	33,400

1"=200FT. 200' 0 200' 400'

SAFETY PAYS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES IMPROVEMENT STUDY

WOOD ISLAND HARBOR, MAINE
AND THE POOL AT BIDDEFORD

ALTERNATIVE PLANS OF IMPROVEMENT

SHEET 1 OF 1 | FIGURE 2-10

BIDDEFORD POOL, ME. SHEET 1 OF 1

CORPS OF ENGINEERS — U. S. ARMY

A B C D E F G H

N224000 N226000 E446000 E448000 E450000 E452000

1 2 3 4 5 6 7 8

WINKY (USE)

BASKET

FRENCH (60)

HILLS BEACH

THE POOL

EXISTING 6 FT. BASIN

FORT HILL

100'

Flood

Ebb

RED DAYMARKER

WHITE 2 (86)

WALL (86)

WHARF (USED BY THE COAST GUARD)

FISHERMAN WHARF

PIN

ROCK, Uncovers at M.L.W.

WOOD ISLAND HARBOR

FLETCHER NECK

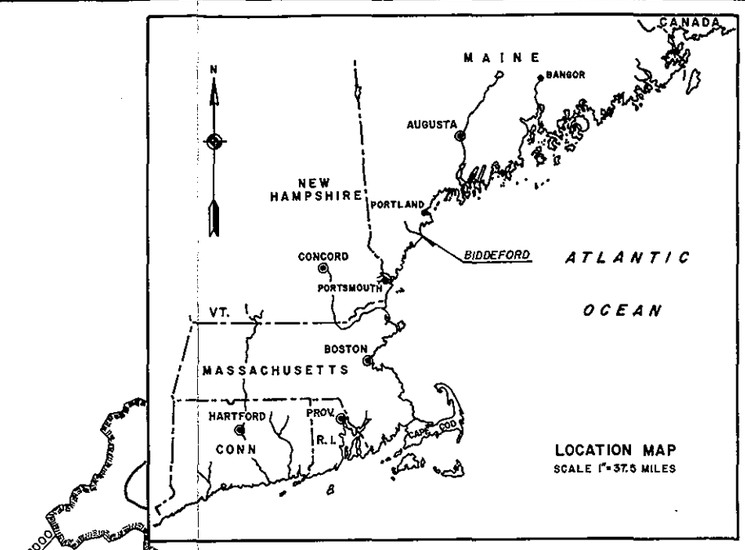
TANK

PLAN
SCALE: 1"=200'

——— INDICATES EXISTING PROJECT LIMITS
— — — INDICATES AREAS OF IMPROVEMENT

PLAN B RECOMMENDED PLAN
CHANNEL - 4200 FEET LONG
-10 FEET DEEP AT M L W
100 FEET WIDE

200' 0 200' 400'
1"=200FT.



SAFETY PAYS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES IMPROVEMENT STUDY

WOOD ISLAND HARBOR, MAINE
AND THE POOL AT BIDDEFORD

RECOMMENDED PLAN OF IMPROVEMENT

SHEET 1 OF 1 | FIGURE 2-11

BIDDEFORD POOL, ME. SHEET 1 OF 1

APPENDIX 3

ECONOMIC ASSESSMENT

Table of Contents

List of Tables

1. PURPOSE OF STUDY

The purpose of this study is to determine the economic justification of dredging an entrance channel through a sand bar located in Wood Island Harbor in Biddeford Maine. The bar has caused delays, groundings and general inconvenience to commercial fishermen who regularly use the harbor.

A federal project was established during the 1950's in Biddeford Pool. This project deepened the anchorage area inside Biddeford Pool which is connected to Wood Island Harbor by a narrow gut. The project currently under review would extend the federal project area out into the main harbor in order to establish general maintenance of the entrance channel. (See figure 1).

2. METHODOLOGY

The economic analysis is based on the procedures accepted by the U.S. Army Corps of Engineers for evaluating the benefits and costs to national economic development (NED) which are associated with improvement plans for small boat harbors and commercial fishing. These procedures have been established in the following reference document:

- U.S. Army Corps of Engineers Planning Guidance Notebook, Regulation No. ER 1105-2-40 Appendix A Section IX NED Benefit Evaluation Procedures: Commercial Fishing.

The economic analysis is accomplished by first determining the economic justification for each alternative plan. Benefits and costs are made comparable by conversion to an equivalent annual basis using a rate of interest employed in the evaluation of all federal water resource projects. For FY 89 the interest rate is 8-7/8 %. Costs and benefits are then expressed as average annual amounts over the 50 year project lifetime. All dollar values are expressed in January 1989 prices. If a project is economically justified, then annual benefits should equal or exceed annual costs. Finally, net benefits (benefits minus costs) for each alternative are calculated and compared. The alternative yielding the highest net benefit figure is considered the most efficient plan for allocating federal and local resources.

3. EXISTING CONDITIONS

Study Area

Wood Island Harbor is located in Biddeford, a southern Maine coastal city with a population of 19,638 (1980 US Census). The harbor is 7 miles southwest from the center of Biddeford and lies directly south of the Saco River and northeast of Fletcher Neck. Portland Harbor is approximately 16 miles north of Wood Island and Cape Porpoise is 5 miles to the south.

The harbor contains 5 islands of various size and is connected to Biddeford Pool, a protected tidal pool, by a narrow gut at its southwestern end. High tidal velocities have scoured the gut and a small area of the pool just inside the gut to depths of 10-20 ft at M.L.W.

Access to Biddeford is provided by interstate 95 and U.S. Route 1. Access to Wood Island Harbor and Biddeford Pool is provided by state routes 9 and 208.

The Economy

The economy of Biddeford is primarily based on manufacturing, with factories producing plastics, machinery and electronic equipment. These industries have enjoyed moderate economic growth over the last eight years. There has also been expansion in the service sector, with employment opportunities increasing in the professional services area, entertainment and food service.

Currently the unemployment rate in Biddeford is 5.3% which is low for the state. However, per capita income is $ 5171 which is lower than the state at $5768 or the county at $6,212. This is an indication that while unemployment is not a problem for Biddeford wages are at the low end of the manufacturing pay scale. The office for Economic Improvement in Biddeford has stated that the main drawback of this situation is that new industry (especially those paying higher wages) is difficult to attract because the current labor force has been tapped out. Table 1 lists the 10 largest employers in Biddeford.

TABLE 1

10 Largest Employers in Biddeford

1. West Point Pepperall Inc.
   Vellux Blankets
   Employs: 600

2. Shape, Inc.
   Cassettes and Cartridges
   Employs: 550-600

3. Biddeford Textile Co.
   Electric Blanket Shells
   Employs: 500-600

4. Corning-Components Inc.
   Tantalum Capacitators
   Employs: 300-350

Table 1 (continued)

5. John Roberts Inc.
   Men's Clothing
   Employs: 275-300

6. Waterbury Companies, Inc.
   Injection Mold Plastics
   Employs: 100

7. Journal Tribune Corp.
   Publishing
   Employs: 90-100

8. Precision Screw Machine Products Inc.
   Machine Parts
   Employs: 80-100

9. Biddeford Industries Inc.
   Finish Poromeric Materials
   Employs: 80-90

10. Wood Structures Inc.
    Roof Trusses
    Employs: 75-80

Another changing aspect of the local economy is the growing demand for local real estate. The real estate industry is this area has been experiencing a boom as demand for vacation property works its way up the southern coast of Maine. The Planning Office in Biddeford cites both advantages and problems along with this type of growth.

On the positive side, as real estate values rise and as population expands the tax base is broadened providing more money for municipal projects. This demand for property has helped bring more jobs, income and new construction to the area.

Not all of this growth is welcomed by the local community, however. The increase in property values means that property is reassessed every 4 years and the tax on existing property is raised. The local community has long been a lower wage area, and a larger tax burden could stagnate local consumption and growth. This condition could contribute to the formation of a segmented economy; one tier containing the vacation community and one tier containing the year round community.

Another problem with continued population growth is the increased pressure it places on the existing municipal infrastructure. The planners offices cites problems with traffic access, water and sewage. This year, for example, Biddeford expended 1 million dollars for a clarifyer to improve the existing sewage plant.

Historical Background of the Existing Project

Federal involvement in Wood Island Harbor and Biddeford Pool began with a 1946 Corps of Engineers study to determine the economic feasibility of general improvements to the harbor. The preliminary report recommended three major improvements which were found to be economically justified:

(1) The construction of a 10.2 acre, 6 ft deep m.l.w anchorage located 800 ft. inside the entrance to Biddeford Pool.

(2) An adjoining 2 acre mooring basin at the wharves on the south side of the gut.

(3) The construction of three rubblemound icebreakers to protect the mooring basin.

The construction of this plan was authorized in May of 1950 and completed in 1956 at a first cost of $136,000.

A second study in 1967 recommended that the existing anchorage in Biddeford Pool be expanded by 7 acres. In addition the second plan called for the construction of a 150 ft wide 8 ft m.l.w entrance channel extending 3000 ft. Southwest from deep water in Wood Island Harbor to the gut at the entrance of Biddeford Pool. While both recommendations were economically justified, construction was never authorized because the city of Biddeford was unable to raise the $96,000 required by the Federal Government as the local share contribution. No further federal improvements were implemented after the 1956 project.

Additional improvements have been made to Fisherman's Wharf at Biddeford Pool. The funding for these improvements was financed through a Farmers Home Administration loan obtained collectively by members of the Biddeford Pool Fisherman's Association. Local fishermen have expressed the need for a larger anchorage in the pool as well as an improved entrance channel to accommodate growing demand for harbor space, especially by larger vessels.

Maintenance of the Harbor Pool

Biddeford Pool, until recently, had not been dredged since the federal project was built in 1956. While the pool is not actually in the present study area it has negative effects on navigation just as the sand bar does and should be mentioned.

Since the Federal anchorage was constructed, there has been considerable shoaling within the pool, decreasing the controlling depth and eliminating some of the mooring space around the outer edges of the achorage.

The two main problems this condition has produced are:

- Shoaling has eliminated mooring space, forcing several boats to the outer harbor anchorage and to other ports.

- There have been several sinkings within the pool because of insufficient water depths for some of the larger boats. When the tide goes out some vessels tip over because of the low water, and when the tide comes back in these vessels are flooded, destroying engines etc.

The Operations Division of NED recently (May 1989) completed maintenance dredging of the pool. This should provide some much needed mooring space and eliminate many of the problems experienced in the Federal anchorage area.

Current Harbor Use

While Biddeford Pool is not a large commercial fishing port, it has significant value within the local economy. Biddeford is in York County which contributes only about 4% to the statewide value of commercial fishing. In 1984 5,088,020 lbs of fish valued at $4,535,714 were landed and sold in York County (National Marine Fisheries Service, Data Management & Statistics Division). Biddeford Pool/Wood Island Harbor contributed $2,500,00 or 55% to this figure.

The commercial fleet consists of 23 year round vessels varying in size from 18ft to 54ft. Three of these vessels are dragger/trawlers while the remaining vessels are lobster boats. Five lobster boats also contain gill- netting equipment. The draggers make 60 trips per year, remaining at sea for 2 or 3 days on each trip. The lobster (and gill netting) boats make between 225 and 250 trips during the 42 ice free weeks per year and work the area immediately around the harbor.

The Biddeford Pool yacht club reports 120 member currently, with approximately 78 boats. Demand for space in the harbor continues to grow but the limited anchorage within the pool precludes any increase in moorings. Some moorings exist on the south side of Stage Island in the less protected Wood Island Harbor anchorage, and the majority of recreational boats are tied up there. The yacht club maintains a wharf at the entrance to the gut and runs a motor tender between the wharf and the harbor moorings.

The recreational boating season in Wood Island Harbor runs about 120 days. The yacht club attempts to appeal to moderate income people with smaller boats (preferably sailboats) as a membership is a modest $200 per year. Each member is then required to purchase their own mooring. A local boatyard makes and places these moorings.

The initial monetary outlay for recreational boaters in Wood Island Harbor is significantly less than it is for boaters in vacation ports close by, such as Portland or Kennebunkport. Since it is affordable and conveniently located, Wood Island Harbor has seen an increased demand for mooring space. Currently there are 20 boats on the waiting list.

In addition to the commercial and recreational fleet based at Biddeford Pool/Wood Island at least three transient vessels visit the harbor each night. These vessels are also tied up in the outside harbor.

4. WITHOUT PROJECT CONDITION

Over the years, a shoal has developed and grown across the natural entrance channel through Wood Island Harbor. The top of the shoal is currently at -6 feet m.l.w. Several local sources have said that they believe the rate of shoaling has accelerated in the last 2-3 years since the dredging of the Saco River.

This continued shoaling has resulted in tidal delays for vessels attempting to transit the harbor during lower stages of the tide. Groundings have become more frequent during the last 2 years for commercial fishermen, raising their operating costs.

Many fishermen in the area believe that lobster stocks have decreased because of the shoal obstructing their landward navigation path. This theory cannot be scientifically substantiated, however, as there is controversy among marine biologists about what causes lobster to change their habitat.

In the absence of a plan to dredge the channel at the entrance to Wood Island Harbor the following conditions are expected to prevail:

Tidal delays will continue to hamper the efficiency of the commercial fishing fleet. Operating costs will continue to rise in the areas of labor time, fuel consumption, and damages.

Groundings will become more frequent as shoaling increases. Higher costs at shorter intervals will be incurred as vessel damage increases.

The recreational boats, currently unaffected by the present shoaling, will begin to experience the same grounding damages as the commercial vessels.

The shoaling area extends into the anchorage cove in Wood Island Harbor. As the shoaling continues this anchorage can accommodate fewer moorings, and general overcrowding. Continued overcrowding during the summer will lead to the chaffing and damage of moored vessels in Wood Island Harbor.

Expansion of commercial fishing will be more difficult. Some large boats may move to nearby ports and small lobster boats will have little incentive to expand their operations with large boats and more diverse equipment. This is only in part due to the channel shoaling; the limited anchorage in the pool and the delayed maintenance dredging contribute a great deal more to this condition than does the channel problem.

The city of Biddeford and local interest lack the capital to facilitate further improvement of the harbor. State aid for upgrading harbors has focused exclusively on larger commercial ports like Portland. It is unlikely that the state will change its policy in the near future.

5. WITH PROJECT CONDITION

Improvement Plans and Costs

Benefit Analysis

Improved conditions for navigation of the entrance to Wood Island Harbor are expected to benefit the commercial fishing fleet. Recreational benefits are not calculated in this analysis. It was established in interviews with the spokesperson for Biddeford Pool Yacht Club, that the current recreational fleet experiences very insignificant levels of damage or inconvenience because of the sand bar. Most of these recreational Vessels have small enough drafts to remain unaffected by the bar for several years to come if a project is not implemented.

Benefits to commercial fishing are measured as the difference between operating costs with and without a project.

Operating costs are first established for the without project situation, and then for each alternative. Costs are calculated for the following categories:

1. Fuel Costs

2. Labor/Time

3. Grounding Damages

The assumptions made for the calculation of each category come from data obtained from economic questionnaires distributed to a sample of 14 boat owners in Wood Island Harbor (from a total of 23). This was accomplished at a workshop conducted by NED in Feb. 1986 at the Biddeford Pool Fire Barn, Biddeford Maine.

The sand bar causes tidal delays. These tidal delays translate into increased fuel costs and additional time spent in boats (labor time). All these expenses incurred by fishermen go beyond normal operating costs.

- The 20 commercial lobster fishing vessels registered in the Biddeford Pool fleet experience tidal delays averaging 1.7 hours.

- The draggers experience tidal delays of 2-1/2 hours.

- These delays per lobster boat occur approximately 40 times per year out of 225 total trips. This is just under 20% of the time.

- The delays for draggers are on a more frequent basis, given their fewer trips. They experience delays 30 times per year out of an average of 60 trips, which is 50% of the time.

Boats are divided into 3 categories. Class A boats have loaded drafts of 3 ft. or less. Class B boats have loaded drafts of 3-5 ft. Class C boats have loaded drafts greater than 5 ft.

- There are approximately 47 crew members on the 23 vessels; 3 boats have 4 crew members, 15 boats have 2 crew members each and 5 boats have 1 crew member per boat.

- Class A boats burn an average of 2 gallons of fuel per hour while laying to in the harbor. Class B boats burn an average of 4 gallons of fuel per hour and Class C boats burn an average of 8 gallons while laying in the harbor.

Grounding damages are increased costs incurred by fishermen when vessel equipment is impaired by grounding out on the bar. The fisherman is then required to replace these vessel parts sooner than he would normally be expected to. Two types of grounding damages are calculated:

1. Propellers

2. Shafts

Each of these damages can be reduced by a specific percentage with a channel improvement. However, damages cannot be reduced to zero because there is always an expected cost assumed for replacement of parts under optimal conditions. Percentages for replacement are included under each calculation.

An 8' channel would be expected to eliminate tidal delays and corresponding costs by 100% for all boats in classes A and B, and by 40% for boats in class C. An 8' channel would reduce grounding damages to boats in classes A and B by an estimated 50% to 75% depending on the catagory of damages, but would have no effect on grounding damages to boats in class C.

A 10′ channel would eliminate tidal delays and their costs for boats in all three classes. It would also reduce grounding damages to all three classes of boats by an estimated 50% to 75% depending on the category of damages.

A 12′ channel would eliminate tidal delay costs and grounding damages to the same extent as the 10′ channel. There are only three vessels with drafts greater than 5′, and these three vessels experience full benefits attributable to channel improvements with the 10′ channel.

Calculations for increased operating costs without a project and for each alternative follow. Table 2 shows operating expenses of the without project condition. Table 3 shows operating expenses of each alternative plan in the with project condition. Table 4 compares the annual operating costs with and without the project, and Table 5 displays the annual benefits associated with each alternative. Table 6 shows the benefit-cost ratios and net annual benefits of each plan.

Wood Island Harbor Commercial
Fleet Operating Costs
Without Project

Increased Fuel Costs

=(No. Boats) x (No. Delays) x (Average Delay - hrs)
x (Gallons used 1 hr.) x (Price/gallon)

Class A	5 x 40 x 1.7 x 2 x $1.05 =		$ 714
Class B	15 x 40 x 1.7 x 4 x $1.05 =		4,284
Class C	3 x 30 x 2.5 x 8 x $1.05 =		1,890
		Total	6,888

Increased Labor Costs

No. boats x No. Crew x No. Delays x Ave. Delay x Wage (*)

Class A	5 x 1 x 40 x 1.7 x $9.40 =		$ 3,196
Class B	15 x 2 x 40 x 1.7 x $9.40 =		19,176
Class C	3 x 4 x 30 x 2.5 x $9.40 =		8,460
		Total	30,832

Grounding Damages

Propellers:

Because of groundings boats replace 1 propeller per year. Class A boat propellers cost $250, Class B & C cost $400 apx.

No. Boats x Cost Propeller x Replacement Per Year

Class A	$250 x 5 x 1	= $1,250
Class B	$400 x 15 x 1	= 6,000
Class C	$400 x 3 x 1	= 1,200
	Total	$8,450

1988 Price level update: 1.05 x 8,450 = $8,873
1989 Price level update: 1.04 x 8,873 = $9,228

(*) Hourly wage obtained from Maine State Dept. of Labor, December, 1988 average hourly wage for a Maine production worker in manufacturing = $9.40/hr.

Shafts:

$350 for Class A boats every 2 years
$750 for Class B & C boats " "

No. Boats x Cost Shaft x Replacements Per Year

Class A	5 x $350 x .5	=	$ 875
Class B	15 x $750 x .5	=	5,625
Class C	3 x $750 x .5	=	1,125
	Total		$7,625

1988 Price level update: 1.05 x 7,625 = $8,006
1989 Price level update: 1.04 x 8,006 = $8,326

Table 2
Total Increased Operating Expenses
(Without Project Condition)

Increased Fuel		$ 6,888
Increased Labor Time		30,832
Grounding Damages		
Propellers	$ 9,228	
Shafts	8,326	
Sub total:		17,554
	Total	$55,274
	Rounded to	$55,300

Increased Operating Costs With an 8' Channel

Fuel Costs

Class A and B boats incur no increase in fuel costs with an 8' channel improvement. Class C boats will incur some increased costs as shown:

Class C 3 x 30 x 1.5 x 8 x 1.05 = $1,134

Increased Labor Time

An 8' channel would eliminate increased labor time costs for Class A & B boats. Class C boats will continue to incur some increased costs as shown:

Class C 3 x 4 x 30 x 1.5 x $9.40 = $5,076

Grounding Damages

Propellers:

An 8' channel would reduce replacement per year by 75% for boats in Class A & B. There would be no effect on Class C

No. Boats x Price Propeller x Replacement Per Year

Class A	5 x $250 x .25 =	$ 313
Class B	15 x $400 x .25 =	1,500
Class C	3 x $400 x 1 =	1,200
		$3,013
	Rounded to	$3,000

1988 Price level update: 1.05 x 3,000 = $3,150
1989 Price level update: 1.04 x 3,150 = $3,276

Shafts:

An 8' channel would reduce replacement per year by 50% for boats in Class A and B, making the replacement factor .25. There would be no effect on boats in class C.

No. Boats x Price Shaft x Replacement Per Year

Class A	5 x $350 x .25 =	$ 438
Class B	15 x $750 x .25 =	2,813
Class C	3 x $750 x .5 =	1,125
		$4,376

1988 Price level update: 1.05 x 4,376 = $4,595
1989 Price level update: 1.04 x 4,595 = $4,779

Increased Operating Costs With a 10' Channel

Increased Fuel Costs

A 10' channel would eliminate all increased fuel costs in every category.

Increased Labor Costs

Incresed labor time costs would also be eliminated for boats in all three categories.

Grounding Damages

Propellers:

A 10' channel would reduce replacement costs per boat by 75% in all three classes. Replacement factor becomes .25.

No. Boats x Cost of Propeller x Replacement Per Year

Class A	5 x $250 x .25	$ 313
Class B	15 x 400 x .25	1,500
Class C	3 x 400 x .25 =	300
		$2,113
	Rounded to	$2,100

1988 Price level update: 1.05 x 2,100 = $2,205
1989 Price level update: 1.04 x 2,205 = $2,293

Shafts:

A 10' channel would reduce replacement costs per boat by 50% per year, in all three classes. Replacement factor becomes .25.

No. Boats x Cost Shaft x Replacement Per Year

Class A	5 x $350 x .25 =	$ 438
Class B	15 x 750 x .25	2,813
Class C	3 x 750 x .25	563
		$3,814
	Rounded to	$3,800

1988 Price level update: 1.05 x 3,800 = $3,990
1989 Price level update: 1.04 x 3,990 = $4,150

Increased Operating Costs With a 12' Channel

Increased operating expenses of the 12' channel equal increased operating expenses of the 10' channel, since all vessels considered in this analysis experience full benefits attributable to channel improvements with the 10' channel.

Table 3 summarizes the increased operating expenses incurred by fishmen under the with project conditions. Increased expenses are estimated for the 8', 10', and 12' channel improvements.

Table 3
Total Increased Operating Expenses
(With Project Condition)

	8' Channel	10' Channel	12' Channel
Increased Fuel	$1,134	0	0
Increased Labor Time	5,076	0	0
Grounding Damages			
Propellers	$3,276	$2,293	$2,293
Shafts	4,779	4,150	4,150
Subtotal	$8,055	$6,443	$6,443
Total	$14,265	$6,443	$6,443
Rounded to:	$14,300	$6,400	$6,400

Table 4

Summary of Commercial Fleet Operating Costs for Each Alternative

	Without Project	8' Channel	10' Channel	12' Channel
Increased Fuel Costs	6,888	1,134	0	0
Increased Labor Time	30,832	5,076	0	0
Grounding Damages	17,554	8,055	6,443	6,443
TOTAL	55,274	14,265	6,443	6,443
Rounded Total	55,300	14,300	6,400	6,400

Annual Benefits

Annual benefits for each alternative equal the difference between operating costs with and without a project. Table 5 lists the total annual benefits for the each alternative, computed from the rounded totals shown in figure 4.

TABLE 5

Commercial Fishing, Wood Island Harbor Total Annual Benefits

	8 Ft. Channel	10 Ft. Channel	12 Ft. Channel
Annual Benefits:	$41,000	$48,900	$48,900

6. Economic Evaluation and Conclusion

Table 6 summarizes the benefits and costs of each channel alternative considered for Wood Island Harbor. All three plans meet the criteria for economic feasibility, as each has positive annual net benefits and a benefit cost ratio over 1.0. Plan B, a 100' wide by 10' deep (mlw) channel is the selected NED plan as it exhibits the highest annual net benefits. Plan B, therefore, optimizes national and local economic resources.

Table 6
Wood Island Harbor, Biddeford, Maine
Economic Evaluation *

	Channel Alternatives	Annual Benefits	Annual Costs**	B/C Ratio	Annual Net Benefits
A)	8' channel	$41,000	$26,100	1.6	$14,900
B)	10' channel	$48,900	$29,400	1.7	$19,500
C)	12' channel	$48,900	$33,200	1.5	$15,700

* All figures rounded and expressed in January 1989 prices
** Calculated at 8-7/8% interest

APPENDIX 4

PERTINENT CORRESPONDENCE

APPENDIX 4
PERTINENT CORRESPONDENCE
TABLE OF CONTENTS

ITEM

New England Division - November 24, 1986.
*Maine Department of Conservation - November 18, 1986.
*Maine Department of Inland Fisheries and Wildlife - Wildlife Division - November 17, 1986.
New England Division - October 30, 1986.
New England Division - October 31, 1985.
City of Biddeford - Office of the City Planner - October 18, 1985.
New England Division - October 8, 1985.
Maine Historic Preservation Commission - June 12, 1984.
New England Division - June 7, 1984.
New England Division - July 13, 1983.
U. S. Senator Bill Cohen - District Representative's Office - June 28, 1983.
New England Division - March 28, 1983.
U. S. Senator Bill Cohen - District Representative's Office - March 18, 1983.
City of Biddeford - Office of the Mayor - March 17, 1982.
New England Division - February 9, 1982.
City of Biddeford - Office of the City Planner - August 11, 1981.
New England Division - May 6, 1981.
City of Biddeford - Office of the Mayor - April 23, 1981.

Note: To avoid repetition documentation denoted with an asterisk (*) can be found in the Coordination Letters section of the Environmental Assessment.

LIST OF STUDY COORDINATION MEETINGS

April 25, 1988 - New England Division field meeting with Maine Geological Survey to view potential intertidal disposal areas off Hills Beach in Biddeford.

February 25, 1987 - New England Division coordination meeting with U. S. Fish and Wildlife Service and other state agencies to discuss disposal site options.

September 15, 1986 - New England Division field sampling and coordination with U. S. Fish and Wildlife Service and Maine Department of Marine Resources.

February 27, 1986 - New England Division meeting with local representatives to obtain commercial fishing data for benefits determination.

April 22, 1981 - Initial meeting between New England Division and local authorities to obtain information relative to existing conditions and desired improvements within Biddeford Pool and Wood Island Harbor.

APPENDIX 4

SECTION A

COPIES OF CORRESPONDENCE
RECEIVED DURING REVIEW
OF DRAFT DETAILED PROJECT REPORT

SUMMARY OF RESPONSES TO DRAFT REVIEW COMMENTS

Responses to Fish and Wildlife Comments (November 16, 1989):

The final Detailed Project Report (DPR) provides additional detail of eelgrass impacts from navigation improvement dredging in Wood Island Harbor. It is shown from Table 3a that most of the eelgrass recovered occurred in deeper water (transect A), outside the proposed dredge area. It is possible that impacts from fishing vessels and/or wave currents may keep the area of eelgrass concentration low (less than 17%) in the proposed dredge area. Dredging of the shoal may allow an increase in eelgrass concentration by reducing fishing vessel and wave current impacts.

Since less than 17% of the proposed dredge area contains eelgrass and the amount of area to be dredged (1200 feet) is low compared to the remainder of Wood Island Harbor, eelgrass mapping is not deemed pertinent. Realignment of the proposed navigation channel to avoid eelgrass would not be practical. Stage Island located to the west and rocks located to the east prevent significant adjustment of the proposed navigation channel. Dredging would occur sometime between October and the end of April. This would minimize impacts to eelgrass beds.

Responses to EPA Comments (December 11, 1989):

Please refer to the response to the Fish and Wildlife letter. Mitigation measures include scheduling dredging operations from October 1 through the end of April. This will avoid the time of year when eelgrass is most productive. Also, turbidity from dredging is expected to cease with the completion of the dredging and disposal operation. Small very scattered patches of eelgrass were observed visually from the height of "Halftide Rock" (figure 1) in this area. This area is not noted as productive eelgrass habitat (Carl Burden, Shellfish Officer, Personal Communication 1/10/90).

Responses to Maine Audubon Society Comments (December 19, 1989):

Cover letter - The proposed navigation improvement project is not expected to increase recreational boat use. The project is designed to provide safe and efficient travel for fishing vessels transversing Wood Island Harbor. It does not provide additional anchorage areas for recreational boats or fishing vessels.

Paragraph 1 - The U.S. Army Corps of Engineers has discussed and evaluated impacts to eelgrass in the area. The amount of impact is not expected to significantly effect resources in the area. Less than 17% of the proposed dredge area contains eelgrass. Refer to the EA.

Paragraph 3 - The temporary loss of eelgrass is not expected to cause significant declines in the current nesting population of eiders on Wood Island. Refer to the above paragraph.

Paragraph 4 - There will be a temporary loss of eelgrass from dredging activities in Wood Island Harbor. Thayer et al. (1984) states that vertical development through rhizomes can occur in eelgrass. The disposal site does not contain eelgrass, therefore sediment accumulation associated with dredge/disposal operations is minimal. The dredge area is expected to shoal in at a rate of 180 cubic yards per year and require maintenance dredging once during the 50 year project life. Eelgrass should be able to tolerate and grow at this shoaling rate.

Due to the sandy nature of the dredged material, turbidity is expected to cease with the disposal operation. Dredging will also occur sometime between October and the end of April, the time of least growth. Therefore, eelgrass adjacent to the dredge area should not be significantly impacted.

Paragraph 5 - See Fish and Wildlife, and EPA responses.

Responses to National Marine Fisheries Service Comments (January 2, 1990):

See responses to Fish and Wildlife, and EPA letters.

Responses to Maine Department of Environmental Protection Comments (March 27, 1990):

The U.S. Army Corps of Engineers agrees with the Maine Department of Inland Fisheries and Wildlife's comments regarding the impacts of dredging activities on seabird nesting sites. As a result, the Corps' proposal to dredge between October 1 and April 30 has been changed to limit dredging between October 1 and March 31.

STATE OF MAINE
Department of Environmental Protection

MAIN OFFICE: RAY BUILDING HOSPITAL STREET AUGUSTA
MAIL ADDRESS: State House Station 17 Augusta, 04333
207 289-7688

JOHN R. McKERNAN, JR.
GOVERNOR

DEAN C. MARRIOTT
COMMISSIONER

March 27, 1990

Catherine Demos
U.S. Army Corps of Engineers
424 Trapelo Rd.
Waltham, Mass. 02254-9149

FAXED:617/647-8518

Re: Wood Island Harbor Dredging/#L-16742-4E-A-N

Dear Ms. Demos:

Please accept this letter as a request for retroactive extension of the federal consistency review timetable. This request for extension is based on additional information received by the State Department of Environmental Protection. The Department has drafted a Water Quality Certification and concurrence with the Corps determination, however, this additional information needs to be addressed by the Corps.

The additional information was submitted by the State Department of Inland Fisheries and Wildlife (IFW), copy attached. IFW's comments relate to colonial seabird nesting sites in Wood Island Harbor and the impact of dredging activities on these sites. Please note that IFW's comments would only affect project activites within 1/4 mile of a nesting site during nesting season (April 1 - August 15). If all dredging activities are greater than 1/4 mile from a nesting site then IFW has no concern about this aspect of the project.

The Corps is proposing to dredge between October 1st to April 30th. Therefore, IFW's concerns would be met by limiting dredging to October 1st to March 31st or during the month of April, to limit dredging operations to those areas greater than 1/4 mile from a nesting site.

As we discussed over the telephone earlier today, the Department order has been drafted with the exception of the aforementioned limitation. Please review the review comments and forward your findings as soon as possible. I expect that a Department order to be available within 1 - 2 weeks if the Corps accepts IFW's comments and incorporates their recommendations into the project.

If you have any questions or comments on this matter please feel free to contact me at any time at (207) 289-2111.

Sincerely,

DAVID SILVER
Division of Natural Resources
Bureau of Land Quality Control

DS/DSCORPSLR

printed on recycled paper

MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
ENDANGERED AND NONGAME WILDLIFE PROJECT

HABITAT INFORMATION REVIEW

Requested By: Sandy Eldridge, MDIFW

Date: 01/90

Site: Wood Island Harbor, Biddeford

Project Type: maintenance dredging of navigational channel

****

Stage Island, Wood Island, Gooseberry Island, and Negro Island in Wood Island Harbor are all colonial-nesting seabird islands. Species known to nest on these islands include Great Black-Backed Gulls, Herring Gulls, Common Eiders, Double-Crested Cormorants, Black-Crowned Night Herons, Glossy Ibises, and Snowy Egrets. Stage Island, which is closest to where dredge spoil from the project will be deposited, had an estimate of 151 nesting pairs of Common Eiders, 65 nesting pairs of Black-Backed Gulls, and 86 nesting pairs of Herring Gulls in 1987.

Disturbance around seabird nesting islands can cause abandonment and/or nest failure. During the nesting season (April 1 - August 15), any activities associated with the dredging project (including dredge spoil deposit) should not occur within 1/4 mile of a nesting island in order to prevent flushing birds from nests.

Reviewed By: Beth I. Swartz bis

Date: 02/07/90

CITY OF BIDDEFORD, MAINE

BIDDEFORD PLANNING BOARD
BIDDEFORD PLANNING DEPARTMENT

P.O. Box 586
Biddeford, ME 04005
(207) 284-9115

Donald M. Simard
Planning Director

March 26, 1990

Chris Hatfield
U.S. Army Corps of Engineers
New England Division
426 Trapelo Road
Waltham, MA 02254

SUBJECT: Approval of Funds for the Wood Island Dredging Project

Dear Chris,

Finally! Attached you will find a copy of the City Council order authorizing the funds for the Wood Island dredging. I hope this meets your needs. We are looking foreward to working with the Corps in the future concerning this issue.

If you have any further questions or if I can be of any furthr assistance to you please feel free to contact me.

Sincerely,

Donald M. Simard
City Planner

cc: Mayor Belanger
Biddeford Harbor Commission
Robert Dodge

City of Biddeford

IN BOARD OF CITY COUNCIL February 20, 1990

Ordered that the Biddeford City Council does hereby appropriate the sum of $47,000. for the dredging of the Wood Island Harbor.

The Project cost of $47,000. is to be fully paid by the mooring fee fund account. If the mooring fee fund account has insufficient funds to meet the payments, then said payments shall be covered by another fund on a loan basis, plus interest.

READ AND PASSED: February 20, 1990

Motion by Councilor Zuke, seconded by Councilor Lavoie to accept the recommendation of Finance Committee and grant the above order its first reading.
Vote: Unanimous.

READ AND PASSED: March 6, 1990

Motion by Councilor Zuke, seconded by Councilor Normand to grant second reading of the order.
Vote: Unanimous.

ATTEST: Claire M. Oliver
Claire M. Oliver, Deputy City Clerk

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Region
Management Division
Habitat Conservation Branch
One Blackburn Drive
Gloucester, MA 01930-2298

January 2, 1990

Joseph Ignazio
Chief, Planning Office
New England Division, ACOE
424 Trapelo Road
Waltham, MA 02254

Dear Mr. Ignazio:

We have reviewed the draft Detailed Project Report (DPR) for the proposed maintenance dredging of the Wood Island Harbor Project at Biddeford, Maine. Project plans consist of dredging 16,000 cubic yards from the navigation channel. Disposal of the dredged material is proposed for an intertidal sand bar between Stage Island and Basket Island.

We do not anticipate any adverse impacts to fishery resources at the inter-island disposal site provided the proposed mitigation measures are implemented.

According to the information in the DPR, the dredge site (navigation channel) contains eelgrass beds. However, what is not clear in the document is the distribution of eelgrass and the extent of project impacts to these resources. Material should not be disposed on the eelgrass or in the sandy patches between eelgrass beds. To adequately evaluate this proposal, we recommend that the eelgrass beds be mapped and adverse impacts to these resources be addressed. However, because of the significant ecological importance of eelgrass to shellfish and other marine resources, we also recommend that the navigational channel be re-aligned to avoid adverse impacts to eelgrass beds.

If you have any questions, please contact Chris Mantzaris at 508/281-9346.

Sincerely,

Thomas E. Bigford

Thomas E. Bigford
Branch Chief

Established 1843

MAINE AUDUBON SOCIETY

Gilsland Farm • 118 U.S. Route One • Falmouth, Maine 04105 • 781-2330

The responsible voice for Maine's environment and natural resources.

December 19, 1989

Colonel Daniel M. Wilson
U.S. Army Corps of Engineers
424 Trapela Road
Waltham, MA 02254-9141

ATTN: Plan Formulation Branch Bldg., 114 South

Dear Mr. Wilson:

Enclosed please find the comments of the Maine Audubon Society on the draft Environmental Assessment for the Wood Island Harbor dredging in Biddeford, Maine.

Along with the recommendation to map the eelgrass meadows prior to dredging set forth in the attached memo, we object to the lack of evaluation of disturbances to migrating birds resulting from increased recreational boat-use in the Pool. Maine's Department of Environmental Protection has taken a strong stand against development that adversely affects the highly significant wildlife values associated with the Pool.

Thank you for your consideration of our comments. Please call me if you have any questions.

Sincerely,

Karin Tilberg

Karin R. Tilberg, Esq.
Director of Advocacy

KRT/mma

pc: Vernon Lang, US Fish & Wildlife Service
Steven Dickson, Maine Geological Survey

MAINE AUDUBON SOCIETY

Gilsland Farm • 118 U.S. Route One • Falmouth, Maine 04105 • 781-2330

The responsible voice for Maine's environment and natural resources.

MEMO: 12/12/89

TO: Karin Tilberg Esq.
FROM: Jody Jones
Program Manager
Wildlife Department

RE: Wood Island Harbor, Biddeford, ME, Dredging Project

In reviewing the draft Detailed Project Report for Wood Island Harbor in Biddeford, I do not think the U.S. Army Corps of Engineers has adequately addressed the issue of impacts on eelgrass meadows in the area. Maine Audubon has compelling interest in the outcome of this project for two primary reasons. First is our long history of involvement with protecting fragile coastal areas, secondly is the fact that we own three separate sanctuaries in the immediate vicinity (East Point Sanctuary, Wood Island, and Stage Island). I am most concerned with the nesting seabirds that use Stage and Wood Islands.

Wood Island has been designated by the Maine State Planning Office as a State Critical Area because of its history of nesting wading birds including glossy ibis, black-crowned night herons and snowy egrets, all of which require soft bottom habitat and are documented users of eelgrass meadows (Thayer, et al. 1984).

Wood Island also supports a healthy population of nesting eiders which are closely linked with eelgrass meadows. Eelgrass serves as an excellent substrate for invertebrates and fishes that are utilized by nesting eiders. In addition, eiders face numerous obstacles during the breeding season that limit their success including low reproductive rate, high predation by avian predators,and a short breeding season. The additional stress of loss of foraging habitat (i.e, eelgrass meadows) may cause declines in the current nesting population of eiders on Wood Island.

Indeed, contrary to the assertion that this project would not have any adverse affect on the eelgrass meadows, Thayer et al. (1984) states that dredging and filling are probably the most deleterious of man's impacts on eelgrass meadows. Although eelgrass is capable of vertical development through rhizomes. Thayer also states that such development rarely matches the rate at which sediments from

dredging operations accumulate. High turbidity during the dredging process causes die-offs in areas adjacent to the dredging thereby affecting areas larger than the immediate channel or fill site.

Because of this, Maine Audubon recommends that the eelgrass meadows in the Wood Island Harbor area be mapped prior to any dredging in the area. It is essential that the birds nesting on Wood Island not be robbed of a primary food source. Without a clear picture of exactly how extensive the eelgrass meadow are, we can only speculate as to what would be lost if dredging were allowed.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
TRANSPORTATION BUILDING
STATE HOUSE STATION 16 AUGUSTA, MAINE 04333-0016

DANA F. CONNORS
Commissioner

December 13, 1989

Colonel Daniel M. Wilson
Division Engineer
U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Subject: Wood Island Harbor, Biddeford, Maine
DRAFT Navigation Improvement Study, Detailed Project Report and Environmental Assessment

Dear Colonel Wilson:

The State of Maine, Department of Transportation has reviewed the draft Navigation Improvement Study, Detailed Project Report and Environmental Assessment for the proposed Wood Island Harbor Project in Biddeford, Maine. The Department hereby approves the proposed Project in concept.

The Department, in cooperation with other State agencies, is currently developing a program to address the short and long term needs of the State of Maine's marine infrastructure. This Program will include an element which provides a portion of the local match for Army Corps of Engineer projects. If the Program is accepted and funded by the Legislature, the Program would be able to support a major portion of the local share of this Project. We encourage the Army Corps of Engineers to proceed with the development of this Project and will keep you informed on the progress of our Marine Infrastructure Program.

Should you or your staff need further information on this Project or our Program, please contact Mr. Robert D. Elder, Director, Ports & Marine Transportation Division at (207) 289-2841.

Sincerely,

MAINE DEPARTMENT OF TRANSPORTATION
Bureau of Transportation Services

Russell W. Spinney
Deputy Commissioner

RWS:ty

cc: Robert D. Elder

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

December 11, 1989

Mr. Joseph L. Ignazio, Chief
Planning Division
US Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

Dear Mr. Ignazio:

This letter is in response to the November 8, 1989 request for our review and comments on the draft Detailed Project Report, including an Environmental Assessment, Section 404(b)(1) Evaluation and Finding of No Significant Impact for a Section 107 Navigation Improvement project in Wood Island Harbor, Biddeford, Maine.

The recommended plan would designate a navigation channel starting just inside the gut at Biddeford Pool and extending 4,200 feet in a northeasterly direction into Wood Island Harbor. The proposed channel would be 100 feet wide and 10 feet deep at mean low water. The project includes hydraulic dredging of approximately 16,000 cubic yards of clean sandy material in a portion of the proposed channel as it passes between Wood Island and Stage Island. The dredged material would be pumped through a pipeline approximately 1/2 mile and deposited, on a one-time basis, on the northern (seaward) side of the sand bar between Stage Island and Basket Island.

While this disposal site is a non-designated disposal site, provided all mitigative measures as stated in the Environmental Assessment (EA) are implemented, we do not foresee any long term adverse environmental impacts with the one-time use of the proposed disposal site. Since hydraulic dredging is proposed for the project and no suitable beach nourishment sites could be located within a 1 mile radius of the dredging site we do not object to the proposed disposal site, which keeps the clean sandy material within the littoral system.

We do have one concern with the proposed project. That is the lack of detailed information on the eelgrass resource within the vicinity of the proposed dredging location. The Fish and Wildlife Service, in their planning aid letter dated November 24, 1986, notes that these eelgrass beds have high ecological value, biological productivity and are relatively scarce. We request that further information on the project's impacts to the eelgrass beds at the dredging site be incorporated into the final Environmental Assessment. This should include detailed information on the location of eelgrass distribution and abundance within the project's vicinity. It should also address the dredging impacts and the mitigative measures that will be taken to prevent any long term adverse impacts to this valuable resource (e.g., determining an adequate buffer from the edge of the channel to eelgrass beds).

In order to better assess these impacts from a regional standpoint we request you incorporate a discussion on information that is available on the distribution and abundance of eelgrass within Wood Island Harbor south of the Saco River. Should this analysis indicate that adverse impacts would occur to the eelgrass beds, we believe the project should be modified to reduce or eliminate impacts to these areas.

As a general matter, we request that future EAs contain more detailed information regarding the feasibility of using alternative disposal sites (e.g., upland disposal sites, designated ocean disposal sites, etc.) which would include cost estimates. Also, incorporating more detailed information on ocean current patterns and dispersal patterns at proposed non-designated disposal sites would help us to assess the environmental impacts when such sites are proposed for use.

In summary, we do not anticipate any significant adverse environmental effects to occur from implementation of this project if the concerns stated above are adequately resolved in the final Detailed Project Report and Environmental Assessment.

Please contact Virginia Laszewski of my staff at (617) 565-4421 if you have any questions concerning these comments.

Sincerely,

Douglas A. Thompson, Chief
Wetland Protection Section

cc: Ron Manfredonia, Chief, WQB
Mike Tehan, FWS, Concord, NH
Chris Mantzaris, NMFS, Gloucester, MA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

Joseph Ignazio
Chief, Planning Division
New England Division
Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

November 16, 1989

Dear Mr. Ignazio:

This is in response to your letter of October 12, 1989, requesting our views on the draft Detailed Project Report for the small navigation project at Wood Island Harbor, Biddeford, Maine. We hereby submit our final Fish and Wildlife Coordination Act Report on the project in accordance with Section 2(b) of the Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq.

The proposed project involves designating a 4200-foot long navigation channel from deep water in Wood Island Harbor to just inside the Gut at Biddeford Pool. The channel would be 100 feet wide and 10 feet deep at mean low water. Most of the channel is naturally deep, however, a segment approximately 1000 feet long, between Stage Island and Wood Island, has shoaled and requires dredging. Approximately 16,000 cubic yards of clean sandy material would be removed with a hydraulic dredge and disposed of on the intertidal sand bar between Stage Island and Basket Island.

This office provided comments on the proposed navigation project early in the planning process. Our letter of December 17, 1987, noted that no known federally listed threatened or endangered species were known to occur in the project vicinity. Our November 24, 1986, letter to the Planning Division identified fish and wildlife resources of the project area and recommended measures to avoid dredge and disposal impacts. An alternate disposal site was selected by the Corps in 1988 to avoid productive intertidal habitat at Hills Beach. Our letters of September 1 and December 6, 1988, addressed fish and wildlife impacts at the new Stage Island-Basket Island disposal site.

The draft Detailed Project Report (DPR) generally provides a good description of fish and wildlife resources in the project area, potential project impacts, and required mitigation. We expect no significant impacts to fish and wildlife resources at the inter-island disposal site with implementation of the proposed mitigative measures. One issue that should be further addressed in the final DPR, however, is the extent of project impacts to eelgrass beds at the dredge site.

Biological sampling by the Corps in August, 1986, documented eelgrass within the area proposed for dredging. Our November 24, 1986, letter described the significant ecological importance of this resource and requested that eelgrass beds be mapped and avoided to prevent impacts from dredging. These concerns

were reiterated in our December 6, 1988, letter to the Planning Division. The draft DPR references "very small scattered patches of eelgrass" within Wood Island Harbor, but does not describe their specific location with respect to the designated channel or dredging footprint. The final DPR should provide a more thorough description of grab sample locations and eelgrass distribution in the project vicinity, including estimates of the areal extent of dredging impact. There should also be an analysis of mitigation measures to prevent impacts to this valuable resource, e.g. minor shifts in the channel alignment, if appropriate.

We appreciate the opportunity to review and comment on the draft Detailed Project Report. Please contact Mike Tehan of my staff at (603) 225-1411 if we can be of further assistance.

Sincerely,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Area

APPENDIX 4

SECTION B

COPIES OF CORRESPONDENCE
RECEIVED BEFORE REVIEW
OF DRAFT DETAILED PROJECT REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

September 20, 1989

Planning Division
Coastal Development Section

Honorable Michael P. Cantara
Mayor of Biddeford
Biddeford, Maine 04005

Dear Mayor Cantara:

Thank you for your July 31, 1989 letter supporting the Wood Island Harbor Navigation Improvement Project. You asked for an explanation of the term, "open to all".

This office has recently developed a statement that addresses the term "open to all on equal terms". A copy of the statement is attached. This definition will be included in the subject report under a list of "Non-Federal Responsibilities". As stated in the report, the local sponsor will need to provide assurances of intent to comply with these items prior to the project's implementation. At this time, the report is in the final phase of preparation and will be sent to you for your review in December 1989.

Should you have any questions, please feel free to contact me at (617) 647-8220. Mr. Chris Hatfield, of my staff, may also be contacted at (617) 647-8520 concerning this Detailed Project Study.

Sincerely,

Daniel M. Wilson
Colonel, Corps of Engineers
Division Engineer

Attachment

City of Biddeford, Maine

The Honorable
Michael P. Cantara

July 31, 1989

Colonel Daniel M. Wilson
Division Engineer
New England Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Ma. 02254

Re: Wood Island Harbor Dredging Project

Dear Colonel Wilson:

Mr. Chris Hatfield has informed the Biddeford City Planner that the Wood Island Harbor dredging project is under active consideration by your department. I am very pleased and look forward to the actual approval of the project.

The dredging of Wood Island Harbor is something that is needed quite badly. Biddeford is a coastal community and supports a variety of boating activities, commercial and pleasure. The availability of adequate anchorage areas is essential to the continuance of our local commercial fishermen, particularly considering the acute competition for mooring space.

The City is in full support of the dredging project and will provide whatever reasonable assistance you may require. Unfortunately, as you are well aware, these are austere times for public financing; any financial support from the City will be extremely limited.

Chris mentioned that the Corps is in the process of developing a policy addressing its goal of "open to all". The City of Biddeford has recently adopted a harbor management ordinance consistent with the provisions established by the State of Maine. From what Chris has told us, the "open to all" policy appears to be a significant issue. The Corps' concept and what is allowed by the States may not be consistent.

Please provide information and guidance in this matter as soon as possible, particularly any policy concerning assignment of mooring spaces and the establishment of fees.

Sincerely,

Michael P. Cantara

Michael P. Cantara, Mayor

MPC/dw

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

December 30, 1988

Planning Division
Impact Analysis Branch

Mr. Earle G. Shettleworth, Jr.
Maine State Historic Preservation Commission
55 Capitol Street
State House Station 65
Augusta, Maine 04333

Subject: Wood Island Harbor Navigation Improvement Project: Disposal Area

Dear Mr. Shettleworth:

Pursuant to a conversation between Dr. Spiess of your staff, and Ms. Atwood of my staff on September 22, 1988, we are forwarding additional information relating to the geomorphology of the disposal area for the proposed Wood Island Harbor Navigation Improvement Project in Biddeford, Maine (Figures 1 and 2). The dredging area was approved by your office in the telephone conversation on September 22, 1988. We believe this information supports the conclusion that the disposal area has a very low archaeological potential.

A site visit was made by Corps archaeologists on November 21, 1988 during a -1.6 foot tidal stage (Plates 1-6). Background research on the geomorphology of the area was conducted to address the question of the archaeological potential of the proposed disposal site.

Basket Island and Stage Island are part of a tombolo system which is comprised of the southern headlands enclosing Saco Bay, and includes Biddeford Pool. Littoral materials in this area consist predominantly of fine and medium sands. According to a 1979 Corps study, the prevailing winds in Saco Bay are probably the most important factor in long term sand distribution. There is a seasonal variation in weather patterns with southerly winds in the summer, and northerly winds in the winter, resulting in bidirectional sand transport, with a net overall sand transport being in a northern direction.

A Corps report on beach erosion at Hills Beach (see Figure 2) demonstrated a northward movement of littoral drift along the beach (Beach Erosion Control Report on Cooperative Study of Hills Beach, Biddeford , Maine. U.S. Army Engineer Division, New England Corps of Engineers, Waltham, MA, 1961). Movement of material between Basket and Stage Islands and Hills Beach is shown by the development of the existing tombolos. The extensive shoals are evidence of the offshore movement of material.

Historic hydrology maps of Wood Island Harbor illustrate the movement of sand on the tombolo. Using the six foot contour line as a reference point, figures 3, 4 and 5 show how the sand has moved across this area from 1859 to 1923. The 1967 coastal map (Figure 6) shows the six foot contour line well north of its position in 1923, demonstrating the general northward movement of sand.

Due to the dynamic nature of the tombolo system any prehistoric sites or shell middens would either have been destroyed by sand transport or very deeply buried by the development of the sand bar. The deposition of 11,500 cy. of dredged material along the tombolo would only raise the level of the sand bar about four to six inches. Given the degree of movement and accretion of material in this area and the minimal physical effect the deposition will have on the tombolo, we feel that use of the Basket Island disposal site would be unlikely to have an effect upon any structure or site of historic, architectural or archaeological significance as defined by the National Historic Preservation Act of 1966.

We would appreciate your concurrence. If you have any questions, feel free to contact Kate Atwood at (617)-647-8796.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

Enclosure

cc: Ms. Atwood-113N, Ms. Demos-113N, Mr. Hatfield-114S
Mr. Rubin-113N, Mr. Pronovost-113N, IAB File, Plng Div File
Reading File

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

November 8, 1988

Planning Division
Impact Analysis Branch

Mr. Gordon E. Beckett
Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
400 Ralph Pill Marketplace
22 Bridge Street
Concord, New Hampshire 03301-4901

Dear Mr. Beckett:

The following comments are written in response to your letter of September 1, 1988. Your letter commented on two Corps of Engineers projects located within the Saco Bay area of Maine. The projects are the proposed Wood Island Harbor navigation improvement study and the Biddeford Pool maintenance dredging study. Comments received on the Wood Island Harbor study will also be addressed in the Project Report and Environmental Assessment. Results of the benthic samples collected from the proposed disposal site for Wood Island Harbor have been forwarded to your office.

Several criteria are considered when selecting a disposal site for a proposed dredging project. These criteria include: location of suitable disposal sites, environmental impacts, social impacts, cost, and the quality and quantity of the material to be dredged. The 404 (b)(1) and/or Section 103 guidelines are also followed to assure proper selection of disposal sites. As a result, each project possesses unique criteria for selecting an appropriate disposal site. Such is the case for the two projects mentioned above.

The above criteria were used in selecting the most suitable disposal sites for the two proposed projects. Grain size data from Biddeford Pool showed samples to contain fines as high as 24 percent with an average of 13 percent. According to draft guidelines established by the Maine Department of Environmental Protection, the quality of the material would not be acceptable for beach nourishment. As discussed in the Environmental Assessment, there are no suitable upland disposal sites capable of accepting this material. The longer haul to the Cape Arundal Disposal Site (an ocean disposal site) would require additional funds. Sponsorship for the additional funds is not available. Therefore, the Saco Bay Disposal Site was selected as an appropriate site for the disposal of dredged material from Biddeford Pool.

Substrate sampled from the proposed Wood Island Harbor navigation improvement channel revealed material low in contaminants and fines (<4%). It is Corps policy to use this material in a beneficial and cost efficient manner. Disposal of the dredged material was originally planned for Hills Beach as beach nourishment. However, anticipated impacts to soft-shell clam habitat discouraged use of this site. Standard operating procedures, based on cost considerations, limit the hydraulic dredge pipeline to one mile from the dredging area. This restriction limits the area of disposal to a one mile radius, thereby eliminating beaches (such as Ferry Beach), which are outside the one mile radius.

The material from the proposed navigation improvement channel is of a clean, sandy nature. Disposal of the dredged material in an area infuenced by littoral currents would benefit the coast of Maine by maintaining the dredged material within the littoral system. Use of the inter-island sand bar would maintain the dredged material along the coast without causing significant environmental impacts. This site was also found to be acceptable by the State of Maine's Planning Office and associated departments.

The Biddeford Pool maintenance dredging environmental assessment does not assume that disposal of dredged material from other authorized projects will not occur at the Saco Bay Disposal Site. The environmental assessment describes the possibility of 1500 cubic yards of material to be dredged by the Biddeford Pool Yacht Club and the Fisherman's Association. This material was found to be environmentally acceptable for open water disposal and is expected to have the same environmental impacts associated with disposal of dredged material from Biddeford Pool. The amount of material to be dredged by non-Federal interests is less than four percent of the material proposed to be dredged from Biddeford Pool. This material would be disposed of at the same time as the Federal project.

No other authorized projects are known at this time which are considering the use of the Saco Bay Disposal Site for disposal of dredged material. The Saco Bay Disposal Site is not a preferred disposal alternative for the Pine Point Harbor, Maine navigation improvement study. The preferred disposal alternative for that study is upland. No maintenance dredging projects in the Saco Bay area (besides Biddeford Pool) are expected to use this disposal site. The disposal site for material dredged from Saco River is Ferry Beach. No other use of Saco Bay Disposal Site is known except for the possible use of this site for maintenance dredging of Biddeford Pool in 20 to 30 years. Determining environmental and cumulative impacts from a possible maintenance dredging project in 20 to 30 years without knowing the quantity and quality of the dredged material or the future biology of the disposal site makes assessing these impacts questionable at best.

In summary, several criteria are considered when selecting a dredge material disposal site. These include environmental impacts, social impacts, cost, quantity and quality of material and other factors. These criteria were used in the selection of the sites for the projects commented on in your letter. We believe that the disposal sites selected for each of the projects discussed are environmentally and economically appropriate.

If there are any questions or comments, please do not hesitate to contact Cathy Demos at (617) 647-8231.

Sincerely,

Stanley J. Murphy
Lt. Colonel, Corps of Engineers
Deputy Division Engineer

cc: Ms. Demos, Mr. Hatfield, Mr. Smith, Mr. Birmingham, Mr. Congdon, Mr. Boutilier, Mr. Clark, Ms. Brown, Mr. Hubbard, Mr. Pronovost, IAB Files, Reading Files Plng Div Files

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

October 7, 1988

Planning Division
Executive Office

Mr. Gordon Beckett, Supervisor
Fish and Wildlife Service
400 Ralph Pill Marketplace
22 Bridge Street
Concord, New Hampshire 03301-4901

Dear Mr. Beckett:

Please find enclosed the benthic data Michael Tehan of your staff requested. This data was collected from an inter-island sand bar located between Basket Island and Stage Island, Biddeford, Maine. The sand bar is the proposed disposal site for the Wood Island Harbor Federal Navigation Improvement Study.

Benthic samples were taken at the low water mark on the landward and seaward side of the sand bar, and at the center of the sand bar. Subtidal samples were also taken on the seaward side of the sand bar. The benthic data revealed an area with minimal shellfish populations and no commercial shellfish species. The proposed disposal site contains moderate densities of polychaete and amphipod species.

It is hoped that this information will enable you to complete your review of the proposed disposal site. Additional comments received on 1 September 1988 will be addressed in the Environmental Assessment. Please contact Ms. Cathy Demos at (617) 647-8231 if there are any additional questions.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

Enclosure

cc: Ms. Demos
Ms. Brown
IAB Files
Mr. Hatfield
Mr. Pronovost
Reading
Plng. Div. Files

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

September 9, 1988

Planning Division
Impact Analysis Branch

Mr. Earle G. Shettleworth, Jr.
Maine State Historic Preservation Commission
55 Capitol Street
State House Station 65
Augusta, Maine 04333

Dear Mr. Shettleworth:

The Army Corps of Engineers is preparing an Environmental Assessment for a proposed Navigation Improvement project at Wood Island Harbor in Biddeford, Maine (Figure 1). The proposed project would provide for the establishment of a commercial navigation channel from the gut at Biddeford Pool to deep water in Wood Island Harbor (Figure 2). This will involve the removal of a sandy shoal area between Stage and Wood Islands. Removal of this shoal would involve dredging 11,500 cy. of sandy material to establish a 100 foot wide, ten foot deep channel. [The coordinates for the dredge site in the proposed channel are: (N225400, E450800) and (N226400, E451560), based on the Transverse Mercator System for the State of Maine (west zone)].

In your letters dated 12 June 1984 and 8 December 1986, you expressed concern that the dredging might have a negative impact upon documented and undocumented shipwreck sites given the early importance of Biddeford Pool and Wood Island as anchorages dating from at least the 1630s. Investigations by the Corps have determined that most shoaling in this area has occurred within the last forty years.

A prior Federal Navigation Improvement project within the Biddeford Pool was completed in 1956. The survey report for this project included soundings of Wood Island Harbor. In 1947, the shoal in the proposed channel was 8.5 feet below Mean Low Water (MLW) at its highest point (Wood Island Harbor, Maine and the Pool at Biddeford, New England Division, May 1947, File No. III-D-2-1). In March 1987, additional soundings were taken of Wood Island Harbor. At this time, the shoal was 6.3 feet below MLW (Wood Island Harbor, Maine and the Pool at Biddeford, New England Division, March 1987, Condition Survey).

Test bores were also taken in December 1987 at the proposed dredge site to determine the grain size of the material to the proposed channel depth. The test bores were composed of three samples representing three depth ranges, 6 to 7.5 feet below MLW, 7.5 to 9.5 feet below MLW, and 9.5 to 11 feet below MLW. The material tested consisted of poorly graded sand throughout the three depth ranges. The material averaged 98% fine sand and 2% medium grade sand.

The dredged material will be deposited at the new Basket Island disposal site (Figure 2). The site is an inter-island sand bar that connects Basket Island to Stage Island. The proposed disposal site was selected because of its compatible grain size with the dredged material.

Because of the nature of the dredged material, and its recent deposition, we feel that this proposed Federal Navigation Improvement project is unlikely to have an effect on any structure or site of historical, archaeological or architectural significance as defined by the National Historic Preservation Act of 1966. We would appreciate your concurrence.

If you have any questions, feel free to contact Kate Atwood at (617)-647-8796.

Sincerely,

JOSEPH L. IGNAZIO
Chief, Planning Division

Enclosure

cc:

Ms. Demos
Mr. Hatfield
Mr. Rubin
Mr. Pronovost
Plng Div Files

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO ATTENTION OF

July 26, 1988

Impact Analysis Branch
Planning Division

Mr. Gordon Beckett, Supervisor
U.S. Fish and Wildlife Service
Ecological Services
400 Ralph Pill Building
22 Bridge Street
Concord, New Hampshire 03301

Dear Mr. Beckett:

The Corps of Engineers is conducting a Section 107, Navigation Improvement Study, for Wood Island Harbor in Biddeford Pool, Maine. The proposed project would establish a commercial navigation channel from the gut at Biddeford Pool to deepwater in Wood Island Harbor. Approximately 11,500 cubic yards of sandy material would be dredged between Stage Islands and Wood Island.

Previously the Corps had considered disposal of the dredged material through a hydraulic pipeline to a disposal site on Hills Beach. However, due to a productive tidal flat and soft-shell clam (Mya arenaria) habitat located at Hills Beach, a new disposal site has been selected. The new disposal site selected is an inter-island sand bar located between Stage Island and Basket Island (see Figure 1). This site has been approved by the State of Maine's Planning Office.

Representatives from appropriate Federal agencies are invited to attend a field trip to the proposed disposal site to assess environmental impacts through benthic and shellfish data collections, to address questions concerning the proposed project, and to solicit comments. A field trip at the disposal site is scheduled for 4 August 1988 at 8:30 am. Comments concerning the proposed project are encouraged from your agency if a representative is unable to attend the above field trip.

If there are any additional comments or questions, please do not hesitate to contact Ms. Cathy Demos at (617) 647-8231.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

MAILING LIST

Mr. Gordon Beckett, Supervisor
U.S. Fish and Wildlife Service
Ecological Services
22 Bridge Street, 400 Ralph Pill Bldg.
Concord, New Hampshire 03301

Mr. Douglas Thompson
U.S. Environmental Protection Agency
Region 1
JFK Federal Building
Boston, Massachusetts 02203

Mr. Thomas Bigford
National Marine Fisheries Service
Habitat Conservation Office
2 State Fish Pier
Gloucester, Massachusetts 01930-3097

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF
Planning Division
Coastal Development Branch

April 18, 1988

Silkman, Director
Maine State Planning Office
184 State Street
State House, Station 38
Augusta, Maine 04333

Dear Mr. Silkman:

On April 25, 1988, members of my staff conducted a field visit with Mr. Steven Dickson, of the Maine Geological Survey, to view potential disposal areas for our Wood Island Harbor - Biddeford Pool entrance channel project.

The field survey conducted around low tide, focused on intertidal areas off Hills Beach in Biddeford. The purpose of this survey was to locate an adequate disposal area within our distance limitation which would not involve significant impacts on shellfish resources. The material to be dredged is fine sand and location of a site exhibiting similar substrate would also be preferred. The proposed project is shown in the attached Figure 1.

As shown in the attached Figure 2, at lower tides there are exposed tombolos between Hills Beach and Basket Island, and between Hills Beach and Stage Island. There is also a merged pair of bars between Basket and Stage Islands. The top of the Basket Island Tombolo is coarse sand grading to fine sands toward the mean low water (MLW) elevation. Coarse sands exist along all of Hills Beach itself. The Stage Island Tombolo is topped by a ridge of stone cobble and blue mussels, and at its landward reach is at a much lower elevation than the tombolo at Basket Island. A former pair of bars connecting Stage and Basket Islands and their tombolos has merged into a wide single bar. This bar, the tombolos and the beach surround a basin of finer sediments. The top of the outer ridge on the bar is coarser sands with finer material seaward and landward.

Less compacted sands of various grain sizes exist in the areas west of the Basket Island Tombolo. A number of converging bars and elevated flats exist in this area. This area is well sheltered by the Saco River South Jetty as well as Basket Island and its tombolo, and is the site of the most mature established shellfish populations. The largest individual clams were encountered in this area.

The lower tidal portions of the two tombolos, especially in more sheltered areas in the lee of the islands, supported shellfish populations of smaller individuals, as did the shoreward side of the inter-island bar. Along the west side of the Basket Island Tombolo, a large concentration of clam worms was encountered which appears to have substantially reduced clam populations in that area, with numerous shell fragments littering the surface. Figure 2A shows the location of mussel, clam and worm populations. Figure 2B shows various grain size locations.

In summary, it appears that the site most compatible to the dredged material, in terms of grain size would be along the central reaches of the seaward side of the inter-island bar. This site would also be best in terms of having the least potential on shellfish resources since none were present. The site also presents the least potential for rapid redistribution of the dredged sand into adjacent areas where shellfish are present.

It is requested that the state planning office provide comments on the conclusions noted above which were drawn from this joint Corps-State field investigation. This cooperative site visit effort proved very productive at demonstrating state resource concerns as well as our own project needs. A suitable disposal site was identified which appears to satisfy the concerns and needs of both the Corps and the State. Your timely concurrence with this determination will enable a swift completion of our Feasibility Report and Environmental Assessment for this much needed commercial navigation project.

If you have any questions or comments, please feel free to contact the Project Manager, Ms. Susan Scott, who can be reached at (617) 647-8549.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

January 27, 1987

Planning Division
Impact Analysis Branch

Mr. Douglas Beach
National Marine Fisheries Service
Habitat Conservation Office
State Fish Pier
Gloucester, Massachusetts 01930

Dear Mr. Beach:

We are proposing to conduct a Section 107, Navigation Improvement Project, at Wood Island Harbor, in Biddeford Pool, Maine. The purpose of this letter is to request a list of endangered or threatened species for the project area, pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended. Please find enclosed a location map of the area to aid you in your work.

The proposed project involves establishment of a commercial navigation channel from the gut at Biddeford Pool to deep water in Wood Island Harbor. This would provide for a 125 foot wide by 10 foot deep channel which would remove approximately 14,500 cubic yards of material. The current proposal for disposal of the dredged material involves hydraulically pumping the material to nearby Hills Beach for beach nourishment.

If you require any further information about the proposed project or the affected area please contact Cathy Demos of the Impact Analysis Branch at FTS 839-7231.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

Enclosure

cc:
Ms. Demos
Mr. Korber
Mr. Bellmer
Mr. Pronovost
IAB Files
Plng Div File
Reading File

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO ATTENTION OF

December 31, 1986

Planning Division
Coastal Development Branch

Mr. Joseph Kelley
Director of Marine Geology
Department of Conservation
State House, Station 22
Augusta, Maine 04333

Dear Mr. Kelley:

In response to your letter dated November 18, 1986, we have enclosed a copy of the drawings indicating the exact location of the dredge site and disposal area for the proposed navigation channel at Wood Island Harbor, Biddeford, Maine.

We would appreciate it if you could provide us with any detailed information regarding the subsurface geology of the dredge site, so that a final determination on the suitability of the dredge material for beach nourishment on Hills Beach can be made.

If you have any questions regarding the Wood Island Project, please contact the Project Manager, Mr. Raymond Korber at (617) 647-8553.

Sincerely,

Donald W. Mann
for: Joseph L. Ignazio
Chief, Planning Division

Enclosure

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO ATTENTION OF

November 24, 1986

Planning Division
Impact Analysis Branch

Mr. Earle G. Shettleworth, Jr.
Maine State Historic Preservation Commission
55 Capitol Street
State House Station 65
Augusta, Maine 04333

Dear Mr. Shettleworth:

The US Army Corps of Engineers is presently undertaking a detailed project study of navigation improvements to Wood Island Harbor in Biddeford Pool, Maine. Reconnaissance studies were initiated in 1981 at the request of the City of Biddeford to investigate the feasibility of Federal participation in improving navigation under the existing continuing authorities for small navigation projects. The results of this and subsequent analyses have led to the formulation of the following proposed plan. The project would provide for the establishment of a commercial navigation channel from the gut at Biddeford Pool to deep water in Wood Island Harbor (see attached map). This will involve the removal of a sandy shoal area between Stage and Wood Islands. Presently, we are considering a 125 foot wide by 10 foot deep channel which would involve the removal of approximately 14,500 cubic yards (cy) of material. Other alternatives which are also being evaluated include:

1. 100 foot wide, ten foot deep channel involving 11,500 cy.
2. 125 foot wide, eight foot deep channel involving 4000 cy.
3. 100 foot wide, eight foot deep channel involving 3500 cy.

The material is composed of medium of fine sand and is suitable for beach nourishment of nearby Hills Beach. Ocean and upland disposal are also being considered.

We are now beginning project studies to determine the environmental resources in the project area for the preparation of the environmental assessment and plan formulation. We have in our files a letter from your office dated 12 June 1984 indicating that the Biddeford Pool/Wood Island area was potentially sensitive for historic shipwrecks. The area to be dredged has been significantly altered since your initial review of the project. Please review the current project area and let us know if you have concerns about historic resources on the sandy shoal between Stage Island and Wood Island Harbor. We anticipate that a Detailed Project Report/Environmental Assessment would be prepared in the next few months for public release in the summer of 1987. We look forward to continued cooperation with your agency. Should you have any questions, please contact Marie Bourassa at (617) 647-8140 or Ray Korber, project manager, at (617) 647-8520.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

cc:
Ms. Bourassa
Ms. Demos
Mr. Korber-114S
Mr. Rubin
Mr. Pronovost
IAB Files
Reading Files
Plng Div Files

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

October 30, 1986

Planning Division
Impact Analysis Branch

Mr Glen H. Manuel
Department of Inland Fisheries and Wildlife
284 State Street, Station #41
Augusta, Maine 04333

Dear Mr. Manuel:

The US Army Corps of Engineers is presently undertaking a detailed project study of navigation improvements to Wood Island Harbor in Biddeford Pool, Maine. Reconnaissance studies were initiated in 1981 at the request of the City of Biddeford to investigate the feasibility of Federal participation in improving navigation under the existing continuing authorities for small navigation projects. The results of this and subsequent analyses have led to the formulation of the following proposed plan. The project would provide for the establishment of a commercial navigation channel from the gut at Biddeford Pool to deep water in Wood Island Harbor (see attached map). This will involve the removal of a sandy shoal area between Stage and Wood Islands. Presently, we are considering a 125 foot wide by 10 foot deep channel which would involve the removal of approximately 14,500 cubic yards (cy) of material. Other alternatives which are also being evaluated include:

1. 100 foot wide, ten foot deep channel involving 11,500 cy.
2. 125 foot wide, eight foot deep channel involving 4000 cy.
3. 100 foot wide, eight foot deep channel involving 3500 cy.

The material is composed of medium to fine sand and is suitable for beach nourishment of nearby Hills Beach. Ocean and upland disposal are also being considered.

We are now beginning detailed project studies to determine the environmental resources in the project area for the preparation of the environmental assessment and plan formulation. We would appreciate any baseline recreational/community environmental data that your office can provide in order to assess environmental/socioeconomic impacts of the various alterative plans. We would also be interested in your concerns about the project. We anticipate that a Detailed Project Report/Environmental Assessment would be prepared in the next few months for public release in the summer of 1987. We look forward to continued cooperation with your agency. Should you have any questions, please contact Cathy Demos at (617) 647-6231 (FTS 839-7231) or Ray Korber, project manager, at (617) 647-8520 (FTS 839-7520).

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

Copies Furnished:
Mr. Al Hutchinson
ME Dept. of Inland Fisheries
& Wildlife
P.O. Box 1298
Bangor, Maine 04401

Ms. Sue Woodward
ME Dept. of Inland Fisheries
& Wildlife
P.O. Box 1298
Bangor, Maine 04401

cc:
Ms. Demos
Mr. Korber
Mr. Bellmer
Mr. Pronovost
IAB Files
Reading Files
Plng Div Files

Mailing list:

Mr. Glen H. Manuel
Department of Inland Fisheries and Wildlife
284 State Street, Station #41
Augusta, Maine 04333

Copies Furnished:
Mr. Al Hutchinson
ME Dept. of Inland Fisheries
& Wildlife
P.O. Box 1298
Bangor, Maine 04401

Ms. Sue Woodward
ME Dept. of Inland Fisheries
& Wildlife
P.O. Box 1298
Bangor, Maine 04401

Mr. Richard Barringer, Director
State Planning Office
184 State Street
State House, Station #38
Augusta, Maine 04333

Copies Furnished:
Mr. John Delvecchio
Coastal Zone Management
184 State Street
State House, Station #38
Augusta, Maine 04333

Ms. Naomi Edelson
Critical Area Program
184 State Street
State House, Station #38
Augusta, Maine 04333

Mr. Kenneth C. Young, Commissioner
Maine Department of Environmental Protection
State House, Station #17
Augusta, Maine 04333

Copies Furnished:
Mr. William Laflamme
Bureau of Land Quality Control
State House, Station #17
Ray Building
Augusta, Maine 04333

Mr. Don Witherall
Maine Department of Environmental Protection
State House, Station #17
Augusta, Maine 04333

Mr. Joseph Kelly
Department of Conservation
Maine Geological Survey
State House, Station #22
Augusta, Maine 04333

Mr. Spencer Apollonio, Commissioner
Maine Department of Marine Resources
State Hosue, Station #21
Augusta, Maine 04333

Copies Furnished:

Mr. Brad Sterl
Maine Department of Marine Resources
Box 12
Ogunquit, Maine 03907

Mr. Donald Card
Maine Department of Marine Resources
State Hosue, Station #21
Augusta, Maine 04333

Mr. Louis Flagg
Maine Department of Marine Resources
State Hosue, Station #21
Augusta, Maine 04333

Mr. Gordon Beckett, Supervisor
US Fish and Wildlife Service
Ecological Services
P.O. Box 1518
Concord, New Hampshire 03301-1518

Ms. Elizabeth Higgins
US Environmental Protection Agency-Region 1
Office of Government Relations &
Environmental Review (RGR-2203)
JFK Federal Building
Boston, Massachusetts 02203

Mr. Tom Bigford
Habitat Conservation Branch
Two State Fish Pier
Gloucester, Massachusetts 01930-3097

Mr. Charles Hewett
Maine Audobon Society
Gilsland Farm, 118 Rt. 1
Falmouth, Maine 04105

Ms. Josie Quintrell
Marine Law Institute
241 Deering Avenue
Portland, Maine 04102

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

31 October 1985

Operations Division
Navigation Branch

Mr. David A. Katon
City Planner
P.O. Box 586
205 Main Street
Biddeford, Maine 04005-0586

Dear Mr. Katon:

Thank you for your letter of 18 October concerning the Federal anchorage in Biddeford Pool. I apologize for not fully responding to your last request for information. The material provided here should answer your questions and clear up any confusion which may exist.

It appears that there are two possible disposal options for material from the anchorage: the upland site which you are attempting to secure the use of; and open water disposal, which is more expensive and would involve a financial contribution from a non-Federal interest. Each option is discussed below.

Upland Disposal: I have reviewed the drawings which accompanied your letter of 23 March 1984. It appears technically feasible to construct the site at this location. Whether overriding environmental concerns make it impossible can be determined after the property owners make a decision on the availability of the land. The site may be too small to contain the amount of material removed in maintaining the anchorage's full dimensions. The scope of the dredging would be reduced to insure that all the material could be placed in the site. The attachment provides information on upland disposal areas which is both site specific and general and should assist you in your planning and in answering questions from the land owners.

Open Water Disposal: The only approved open water site in the vicinity of Biddeford Pool is located 13 miles away, approximately 3 miles south of Cape Arundel. The use of this site would escalate the cost of the project by about $100,000 over the cost of nearby land disposal. This amount would be the responsibility of a non-Federal interest.

Please let me know how your discussions with the property owners proceed. I am available to meet with you if you think it would be helpful and can be reached at (617) 647-8322 if there are any questions or comments.

Sincerely,

Mark J. Otis
Navigation Branch

I have enclosed a copy of the drawing which accompanied your letter of 23 March 1984. On this drawing I have shown the location of the containment dike as well as likely locations for the discharge from the dredge, weir structure and baffle dike. Also shown is a typical cross section of the containment dike. The site would be constructed under the maintenance dredging contract. The construction and operation are discussed below.

Construction: The containment and baffle dike would be constructed with material available on site. Your drawing shows the final elevation of the dredged material to be the 9 foot contour. The containment dike would be built to a height three feet above this elevation. I estimate that 10,000 cubic yards of material would be used in dike construction. Based on your engineering department's estimate of site capacity prior to the removal of any material, the site should hold 36,000 - 38,000 cubic yards after dikes are constructed. The baffle dike is installed to alter circulation patterns and increase detention time. A weir structure is installed to regulate the elevation at which water is discharged from the site.

Operations: Dredged material enters the site in slurry form consisting roughly of 20 percent solids, 80 percent water. Substantially all of the solid material must settle out prior to discharging the carrying water for the site. The State DEP will impose an upper limit on the level of susupended solids allowed in the discharge. The elevation of the weir is set at least two feet above the level of solids in the site. During most of the operation there will be considerably more than two feet of water in the site. Odors are not typically objectionable during such operations.

Long Term: The dredging project would likely be performed in the fall. Past sampling shows the majority of the material to be a silty fine sand. It would probably be early summer of the next year before this material stabilized. At that time the dikes could be knocked down to match the elevation of the site. The dredged material is likely to settle between 1 and 2 feet. Over the course of time the site would likely revegitate itself. Steps can be taken to accelerate this process but they would have to be carried out at local expense.

OTIS

City of Biddeford, Maine

OFFICE OF THE CITY PLANNER

The Honorable
Robert M. Farley, Mayor

October 18, 1985

Mr. Mark J. Otis
Navigation Branch Operations Division
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

RE: Biddeford Pool Maintenance Dredging; update on local involvement

Dear Mr. Otis:

This is an update on the local involvement and activities on the requested maintenance dredging project for Biddeford Pool, Maine.

I know it has been awhile since we have communicated on the subject project, but there have been a number of unexpected setbacks locally, which I will not go into detail on.

My attempt now is to pick up the pieces of the project where I left off in March of 1984. My letter to C.G. Boutilier on March 23, 1984 was the last local update and effort on the project that I am aware of.

I forwarded preliminary plans of each of the proposed disposal sites to C.G. Boutilier on March 23, 1984 as part of my update letter. I'm not aware of any response on the proposed locations, so I'm assuming the Corps of Engineers did not respond.

Within the next couple of months, I will attempt to re-open conversation with the potential land owners for the proposed disposal sites. The City needs to establish some sort of commitment from the land owners to utilize their property for disposal, if approved by the D.E.P. There is no sense to file an application without such a commitment.

I have had conversation with Ms. Leeman of Senator Cohen's Office this week and briefed her on the status of the project and the reason for inactivity at the local level since March of 1984.

In my letter of March 23, 1984 I requested a possible "local share estimate" of expenses for ocean dumping, so that I might have a figure to approach the Mayor and Municipal Officers with. I'm not aware of any response or estimate being forwarded to date. It's hard to approach someone to ask for money without an estimate of costs, even a very rough preliminary estimate would help. Since the Corps of Engineers is familiar with ocean dumping costs associated with other projects, I thought the Corps of Engineers would be the best source of information. Any assistance would be greatly appreciated.

If a suitable disposal method and site can be arranged for the maintenance dredging project, I feel the requested construction improvements project to be accomplished under Section 107 of the River and Harbor Act of 1960, will be less of a problem because of the area involved and the better quality of material being removed. Beach enrichment has been used locally along Hill's Beach, and that method of disposal appears to be a very viable method of disposal. I've had a number of calls from interested property owners requesting to be considered for that particular project.

I'll forward you any additional information that I collect in the next couple of months.

Respectfully submitted,

David A. Katon
City Planner

cc: Mayor Robert M. Farley
Ms. Linda Leeman
Mr. Reed Rumery
C.B. Boutilier
City Engineer
Files (2)

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO ATTENTION OF

8 October 1985

Operations Division
Navigation Branch

Honorable William S. Cohen
United States Senate
Washington, D.C. 20510

Dear Senator Cohen:

This is an update on our activities at Biddeford Pool, Maine, as requested by Ms. Leeman in her letter of September 19, 1985.

The City of Biddeford, through its Planner, Mr. David Katon, has been conducting a diligent search for a suitable disposal area for dredged material, but with no success to date. The project authorization requires that such areas be provided by the City. It is understandable, given the topography, that few non-sensitive areas could be considered to be suitable for this purpose. We have explored prospects of innovative uses, such as marsh creation, with State of Maine personnel as a possible alternative. To date, there has appeared no conflict-free, environmentally or socially acceptable solution to the disposal question.

Recognizing the benefit which would derive from the project at full dimensions, open water disposal is probably the most effective option. If the City finds that it is in a position to cost share to some extent in whatever the added expense of going to sea involves, I believe we could respond within a reasonable time. We will continue to maintain contact with the City and state agencies to keep abreast of any developments.

As you are aware, there is also a planning study underway to address the feasibility of constructing improvements to the existing project. This is being done under the Section 107 authority provided for in the River and Harbor Act of 1960. I'm certain that the issue of disposal will be central to the outcome of this effort as well.

Please contact me at (617) 647-8222 if there are any further questions concerning the project. The following members of my staff may also be contacted. Mr. Mark Otis (647-8322) of my Operations Division concerning maintenance dredging and Mr. Collis Adams (647-8549) of my Planning Division concerning the Detailed Project Study.

Sincerely,

Edward D. Hammond
Lt. Colonel, Corps of Engineers
Acting Division Engineer

MAINE HISTORIC PRESERVATION COMMISSION
55 Capitol Street
Augusta, Maine 04333

Earle G. Shettleworth, Jr.
Director

Telephone
207-289-2133

June 12, 1984

Mr. Joseph L. Ignazio
Chief, Planning Division
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

Dear Mr. Ignazio:

Thank you for your letter of the 7th concerning proposed dredging in Biddeford Pool and Wood Island Harbor, Biddeford, Maine.

These areas are potentially sensitive for historic archaeological underwater sites. Biddeford Pool, originally known as Winter Harbour, was occupied by English settlers on and off in 1616-17, 1630-75, and after 1708. This settlement occupied the littoral of Biddeford Pool and may mean that early shipwrecks or artifact concentrations deposited by erosion (due to coastal subsidence) are present beneath the Pool's waters.

As for Wood Island Harbor, here again undocumented early colonial shipwrecks may be present. In addition, the following wrecks are documented for the vicinity:

State Site #	Vessel	Date Sunk	Location
ME 041-03	Fleetwing	Mar. 2, 1891	Near Biddeford Pool
ME 041-04	Anahuac	Apr. 15, 1923	Fortunes Rocks
ME 041-05	George & Albert	Nov. 17, 1887	Wood Island
ME 041-06	Marshall Perrin	Nov. 16, 1907	Wood Island
ME 041-07	Fred Tyler	Oct. 27, 1920	Biddeford Pool
ME 041-08	Roger Drury	Jan. 12. 1918	Biddeford Pool

While I am not suggesting that any of these potential sites are necessarily of National Register significance, it is nevertheless clear that the Pool and adjacent waters have seen extensive maritime activity for centuries.

Therefore, unless the proposed dredging is solely of a maintenance nature, I would suggest that underwater archaeological survey (and ultimately salvage, if necessary) would be needed prior to commencement of the work.

As always, if you should have any questions concerning this matter, please do not hesitate to let Dr. Bradley or me know.

Sincerely,

Earle G. Shettleworth, Jr.
State Historic Preservation Officer

cc: John S. Wilson, Archaeologist
Planning Division

Dr. Robert L. Bradley
Maine Historic Preservation Commission

EGS/slm

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

June 7, 1984

Planning Division
Impact Analysis Branch

Mr. Earl G. Shettleworth, Jr.
Director
Maine Historic Preservation Commission
55 Capitol Street
Augusta, Maine 04333

Dear Mr. Shettleworth:

As discussed between our Division Archaeologist, John S. Wilson, and Dr. Bradley, of your staff, we enclose plans illustrating proposed harbor improvements at Biddeford Pool. They consist of two components:

1. Deepening of a shallow segment of the currently authorized federal channel.

2. Expansion of the turning basin on its north side. This is currently an area of shallows and mudflats.

Disposal of material in the harbor is proposed on the south side of the harbor in another mudflat area near the commercial wharves, while the channel material would be disposed on Hills Beach.

It appears unlikely that the channel dredging or disposal would affect significant archaeological resources, due to the small area and bathymetric/topographic conditions involved. There appears some possibility that the work proposed within the harbor could affect unrecorded underwater archaeological resources, depending upon the configuration of the early harbor and settlement.

We would appreciate your preliminary comments on this project, to facilitate scoping of any archaeological studies which may be required.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

Enclosure

Copy Furnished:
Dr. Robert Bradley
Maine Historic Preservation Comm.
55 Capitol Street
Augusta, Maine 04333

cc: Mr. Wilson, Mr. Horowitz, Mr. Pronovost, Mr. Misslin-CDB,
Plng Div File, Reading File

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

Planning Division
Coastal Development Branch

13 JUL 1983

Honorable George J. Mitchell
United States Senate
Washington, DC 20510

Dear Senator Mitchell:

In reference to your letter of 27 June 1983 from your Ms. Cadorette, I am pleased to update you on the navigation improvement study and maintenance dredging study for Biddeford Pool and Wood Island Harbor, Biddeford, Maine.

Regarding the maintenance study for the existing Federal project in Biddeford Pool, approximately 40,000 cubic yards of silty sand needs to be removed from our 6 foot deep, 10 acre anchorage. Under the terms of local cooperation for this project, the City of Biddeford is responsible for locating a suitable disposal site. We have been working with Mr. David Katon, the Biddeford City Planner and he is continuing to investigate potential disposal areas. A proposal for accomplishing the dredging would be coordinated with appropriate agencies and interests once a site is located. We would try to fund the work with money from cancellation or deferral of scheduled work.

Regarding the improvement study requested by the city in April 1981, we are currently awaiting funding to allow us to conduct a detailed study under the authority of Section 107 of the River and Harbor Act of 1960. A reconnaissance report was approved in August 1982 as a basis for conducting a detailed study. As requested a copy of this report has been attached.

Funding in this fiscal year will be sufficient to conduct a hydrographic survey of the study area. If funds continue to be available, a detailed study would be conducted over the next 2 to 3 years. If a favorable plan of improvement is identified and approved by the Chief of Engineers, then preparation of plans and specifications and funding of construction would be pursued over the following fiscal year.

Should you have any further questions concerning these two studies, please feel free to contact me at (617) 647-8220, Mr. Mark Habel (647-8525) of my Planning Division is coordinating the Improvement Study, and Mr. Mark Otis (647-8322) of my Operations Division is coordinating the Maintenance Study.

Sincerely,

Carl B. Sciple
Colonel, Corps of Engineers
Division Engineer

Enclosure

Copy Furnished:

Ms. Judith Cadorett
District Representative for the
Honorable George J. Mitchell
5 Washington Street
Biddeford, Maine 04005

cc: Coastal Dev. Br. (3)
Navigation Br.
Exec. Ofc.
Reading
Plng. Div. Files

WILLIAM S. COHEN
MAINE

United States Senate

WASHINGTON, D.C. 20510

11 Adams Street
Biddeford, Maine 04005
June 28, 1983

Colonel Carl B. Sciple
Division Engineer, New England
Division, Corps of Engineers
Department of the Army
Waltham, Massachusetts 02254

Dear Colonel Sciple:

Enclosed please find a letter to Senator Cohen from the President of the Biddeford Pool Fishermen's Association, Reed Rumery. Mr Rumery is writing in behalf of the association regarding the proposed dredging project.

Earlier this year the Senator's office made inquiries in behalf of the fishermen and you provided me with an excellent report of August 1982, a reconnaissance investigation of Wood Island Harbor and Biddeford Pool. The report has been extremely helpful and I have given copies to the City Planner as well as Mr. Rumery.

I am sending Mr. Rumery's letter to you in order that you may be aware of the latest developments here. The letter demonstrates thier concern of lack of space in the harbor, and access to the harbor. They are working with the City Planner to find a suitable place for disposal of the dredging.

If you have any questions, please do not hesitate to contact me. If any engineers are planning to be in Biddeford, I hope you will kindly let this office know.

With best wishes, I am

Sincerely,

Linda F. Leeman
District Representative for
Senator Bill Cohen

Enc/lfl

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

March 28, 1983

Planning Division
Coastal Development Branch

Honorable William S. Cohen
United States Senate
Washington, DC 20510

Dear Senator Cohen:

In reference to your letter of 18 March 1983 from your Ms. Leeman, I am pleased to update you on the navigation improvement study and maintenance dredging study for Biddeford Pool and Wood Island Harbor, Biddeford, Maine.

Regarding the maintenance study for the existing Federal project in Biddeford Pool, approximately 40,000 cubic yards of silty sand needs to be removed from our 6 foot deep, 10 acre anchorage. Under the terms of local cooperation for this project, the City of Biddeford is responsible for locating a suitable disposal site. We have been working with Mr. David Katon, the Biddeford City Planner and he is continuing to investigate potential disposal areas. A proposal for accomplishing the dredging would be coordinated with appropriate agencies and interests once a site is located. We would try to fund the work with money from cancellation or deferral of scheduled work.

Regarding the improvement study requested by the city in April 1981, we are currently awaiting funding to allow us to conduct a detailed study under the authority of Section 107 of the River and Harbor Act of 1960. A reconnaissance report was approved in August 1982 as a basis for conducting a detailed study. As requested a copy of this report has been attached.

If sufficient funds are available in FY 84 a detailed study would be conducted over the next 2 to 3 years. If a favorable plan of improvement is identified and approved by the Chief of Engineers, then preparation of plans and specifications and funding of construction would be pursued over the following fiscal year.

Should you have any further questions concerning these two studies, please feel free to contact me at (617) 647-8220. Mr. Mark Habel (647-8525) of my Planning Division is coordinating the Improvement Study, and Mr. Mark Otis (647-8322) of my Operations Division is coordinating the Maintenance Study.

Sincerely,

Carl B. Sciple
Colonel, Corps of Engineers
Division Engineer

Enclosure

Copy Furnished:

Ms. Linda F. Leeman
District Representative for the
Honorable William S. Cohen
11 Adams Street
Biddeford, Maine 04005

cc: Coastal Dev. Br. (3)
Navigation Br.
Exec. Ofc.
Reading
Plng. Div. Files

WILLIAM S. COHEN
MAINE

United States Senate

WASHINGTON, D.C. 20510

11 Adams Street
Biddeford, Maine 04005
March 18, 1983

Colonel Carl B. Sciple, Division Engineer
United States Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Sciple:

Recently Senator Cohen's office was contacted by Reed Rumery, President of the Fishermen's Association at Biddeford Pool, Maine. He has asked the Senator for assistance in urging the U.S. Army Corps of Engineers to proceed with a navigational improvement project in the areas of Biddeford Pool and Wood Island Harbor.

As you know, in the Northeast, the schedule of the local fishermen is dictated by the unpredictable weather, not by the tides. However, for the larger commercial vessels entering the Biddeford Pool (harbor), the entrance channel is presently impassable at low water, doubly restricting the fishing fleet by tide as well as by weather. Therefore, it is imperative for the channel to be navigable regardless of tides, if this fishing community is to survive.

While I realize that there are other factors involved, such as the disposal of dredging materials in accordance with environmental laws, it is my understanding that the material in the Wood Island Harbor area is very desirable fine beach sand. In addition, David Katon, City Planner for the City of Biddeford, has conferred with this office and he assures me that the City is assiduously pursuing a plan to dispose of material from the Pool harbor to meet requirements of the Department of Environmental Protection as well as the Environmental Protection Agency.

Enclosed please find a plate from a study done in 1967; if there has been a more recent study, I would appreciate your providing the Senator with current information. Furthermore, I would appreciate your looking into this matter at your earliest convenience and providing this office with a report.

Meanwhile, with best wishes, I am

Sincerely,

Linda F. Leeman

Linda F. Leeman
District Representative for
Senator Bill Cohen

LFL/add
Enclosure

City of Biddeford, Maine

The Honorable
Martin J. Rielly, Mayor

March 17, 1982

Colonel C. E. Edgar, III
Division Engineer
Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

Dear Colonel Edgar:

Reference is made to your February 9, 1982 letter concerning the proposed Detailed Project Report for Wood Island Harbor and Biddeford Pool, under Section 107 of the 1960 River and Harbor Act, as amended.

The Biddeford City Council on March 16, 1982 unanimously voted in approval of requesting to proceed with the Detailed Project Report for the above specified location and project.

Therefore, the City of Biddeford formally requests the office of the Chief of Engineers to proceed with the investigation and Detailed Project Report.

Sincerely,

Martin J. Rielly

Martin J. Rielly, Mayor
City of Biddeford

MJR/cms

cc: David Katon, City Planner
James McMahon
Reed Rumery
Luc A. Angers, City Clerk
files (2)

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

NEDPL-C

February 9, 1982

Honorable Roger L. Frechette
Mayor of Biddeford
Biddeford, ME 04005

Dear Mayor Frechette:

Reference is made to your 23 April 1981 request for this office to undertake a navigation study for Wood Island Harbor and Biddeford Pool under the authority of Section 107 of the 1960 River and Harbor Act, as amended.

In response to your request, a reconnaissance investigation was undertaken to assess the feasibility and justification for Federal involvement. In assessing all of the existing data, it has been determined that the proposed navigation improvements for commercial fishing and recreational vessels appear economically feasible, and further detailed study is therefore warranted. I would like to emphasize, however, that this determination is only preliminary in nature and no final decisions have been made as to the overall feasibility of the proposed action. Such a determination cannot be made until completion of the second and final stage of study, known as a Detailed Project Report.

Preparation of a Detailed Project Report will entail the assessment of numerous parameters including economic and engineering feasibility, environmental impacts, and social and cultural effects. The primary purpose of this report will be to identify, evaluate, and compare all possible avenues of project implementation to achieve local, State, and Federal goals in the most favorable manner possible.

Inclosed is a list of eight items of local cooperation which a community participating in a navigational improvement authorized under Section 107 must agree to meet before project implementation. Prior to our forwarding a favorable recommendation of further study

to the Office of the Chief of Engineers, we will require a letter from your office stating your interest for us to proceed with the investigation. If a favorable plan of improvement is recommended in the Detailed Project Report and authorized by the Chief of Engineers, you would be required to enter into a contractual agreement to meet these items of local cooperation during the preparation of plans and specifications prior to construction.

Should project feasibility be based solely on and for commercial navigation, no local cost contribution towards construction is required. However, if both commercial and recreational benefits are used to justify Federal involvement in the proposed project, a percentage of cost reflecting the recreational benefit percentage would be borne by non-Federal interests. It should also be emphasized that regardless of the initial cost sharing on the first cost of construction, all future maintenance costs would become a Federal responsibility.

Should your office make the determination for us to proceed with the investigation, your letter along with our recommendations will be forwarded to the Office of the Chief of Engineers. Should they approve my recommendation, Wood Island Harbor and Biddeford Pool will be placed on our list of pending Detailed Project Reports. As this office handles all requests on a first-come, first-serve basis and due to funding limitations, the present schedule as outlined indicates initiating the Detailed Project Report in Fall 1984, with project implementation, if favorable, during Fall 1987.

Should you have any questions, please feel free to contact me at (617) 894-2400, extension 220. Mr. Mark Habel of my staff is coordinating the investigation. Should your staff desire more information, he can be reached at extension 550.

Sincerely,

Incl
As stated

C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

Copy Furnished:
Mr. David Katon, City Planner
Planning Office
City Hall
Biddeford, ME 04005

Executive Office
Coastal Dev Br
Reading File
Planning Div File

ITEMS OF LOCAL COOPERATION

The following is a list of items of local cooperation under Section 107 the community must agree to meet prior to project implementation.

(1) Provide a cash contribution toward construction costs, determined in accordance with existing policies for regularly authorized projects, in view of recreational benefits, land enhancement benefits or similar type special and local benefits expected to accrue. The present basis for cost-sharing in recreational small boat projects provides that the Federal Government will participate to not more than 50 percent of the first costs of general navigation facilities serving recreational traffic.

(2) Provide, maintain and operate without cost to the United States, an adequate public landing with provisions for the sale of motor fuel, lubricants and potable water open and available to the use of all on equal terms.

(3) Provide without cost to the United States all necessary lands, easements and rights-of-way required for construction and subsequent maintenance of the project including suitable dredged material disposal areas with necessary retaining dikes, bulkheads and embankments therefor.

(4) Hold and save the United States free from damages that may result from construction and maintenance of the project except where such damages are due to the fault or negligence of the United States or its contractors.

(5) Accomplish without cost to the United States alterations and relocations as required in sewer, water supply, drainage and other utility facilities.

(6) Provide and maintain berths, floats, piers, and similar marina and mooring facilities as needed for transient and local vessels as well as necessary access roads, parking areas and other needed public use shore facilities open and available to all on equal terms. Only minimum, basic facilities and services are required as part of the project. The actual scope or extent of facilities and services provided over and above the required minimum is a matter of local decision. The manner of financing such facilities and services is a local responsibility.

(7) Assume full responsibility for all project costs in excess of the Federal cost limitation of $2,000,000.

(8) Establish regulations prohibiting the discharge of untreated sewage, garbage, and other pollutants in the waters of the harbor users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and local authorities responsible for pollution prevention and control.

City of Biddeford, Maine

OFFICE OF THE CITY PLANNER

August 11, 1981

Mr. Mark Habel
Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

RE: Section 107 Navigation Questionnaire

Dear Mr. Habel:

I am pleased to forward the enclosed "Section 107 Navigation Questionnaire" and I am sorry for the delay in response. I hope the contained information is satisfactory and will facilitate the reconnaissance study.

I would also like to add to the importance of the requested project with the following.

Biddeford Pool, consisting of Wood Island Harbor and the "Pool" anchorage area offer excellent protection year around to most vessels. During periods of foul weather, Biddeford Pool can provide the best port between Portsmouth, N.H. and Portland, Maine, but presently is limited because of shoaling, thereby restricting the heavier draft vessels from entering. If you have ever tried to enter Cape Porpoise harbor with any vessel other than an outboard motor boat, you're in for a shock. Biddeford Pool and Wood Island Harbor do not have the obstruction problem presently existing at Cape Porpoise, from lobster pot buoys.

Biddeford Pool can offer emergency repair service, food, fuel and limited docking, but again is somewhat restricted from that service because of existing controlling depths from shoaling.

As noted in the environmental assessment, by the Corps of Engineers, for installation of ice breaker structures at Camp Ellis dated August 1979, specifically items 13, and 15; winter commercial activity "force most fishermen to haul their vessels ashore and remain idle, or relocate to nearby harbors, including Biddeford Pool." "This latter advantage is one not shared by the nearest alternative anchorage at Biddeford Pool, where the entrance channel is almost unnavigable at low tide.

The economic points of interest concerning relocation of part of any fishing fleet because of local conditions also apply to Biddeford Pool today, and is very similar to the environmental assessment report for Camp Ellis.

I am also of the belief that Wood Island Harbor offers a much better approach for entrance, at least during periods of foul weather, as the turbulent conditions present at the mouth of the Saco River, i.e. ebbing tide and onshore wind are sometimes extremely difficult for some vessels.

Please call me if I can be of further assistance on the request for certain improvements at Wood Island Harbor and Biddeford Pool.

Respectfully,

David A. Katon
City Planner

DAK/smg

cc: Mayor Frechette
Mr. Reed Rumery
Mr. James McMahon
Files (2)

encl: as stated

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF

NEDPL-C

May 6, 1981

Honorable Roger L. Frechette
Mayor of Biddeford
Biddeford, ME 04005

Dear Mayor Frechette:

I am pleased to inform you that we have initiated a small navigation improvement study for Wood Island Harbor and Biddeford Pool, Biddeford, Maine in response to your letter dated 23 April 1981.

The initial study stage will be a reconnaissance which will determine if further detailed study of providing improvements to Wood Island Harbor and Biddeford Pool is warranted. A reconnaissance report will assess the feasibility of providing improvements including an expanded and deepened anchorage within the Pool, an access channel through Wood Island Harbor, and a new anchorage in the Harbor. It is expected that this stage will be completed by the fall of this year. At that time, copies of the draft reconnaissance report describing the study process and findings will be transmitted to you for your review and concurrence. In order to facilitate the initiation of the study, please provide the information listed in the inclosed Section 107 Navigation Questionnaire.

Should you have any questions, please feel free to contact me at (617) 894-2400, extension 220. Mr. Habel of my staff is coordinating the investigation. Should your staff desire additional information, he can be reached at extension 556.

Sincerely,

Incl
As stated

C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

cc: Executive Office
Coastal Dev. Br.
Reading File
Planning Div. File

City of Biddeford, Maine

The Honorable
Roger L. Frechette, Mayor

April 23, 1981

Colonel C. E. Edgar, III
Division Engineer
Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

Re: Wood Island Harbor, Biddeford Pool, Maine

Requested Small Navigation Project per Section 107
of the 1960 Rivers and Harbors Act As Amended

Dear Colonel Edgar:

On April 22, 1981, a meeting was conducted at dockside Biddeford Pool to discuss the above referenced item. In attendance were Mr. James McMahon of Congressman Emery's Office, Mr. Mark Habel, Mr. Reed Rumery of the local fisherman's association and Biddeford City Planner David Katon. The purpose of the meeting was to discuss the procedures by which the City of Biddeford and local fisherman's association might work with the Corps of Engineers on a project to re-establish an adequate controlling depth for the designated anchorage area in Wood Island Harbor and navigational entrance channel from Saco Bay into "The Gut" at Biddeford Pool.

Please accept this as an official request by the City of Biddeford for an investigation pursuant to Section 107 of the 1960 Rivers and Harbors Act As Amended for re-establishment of an adequate controlling depth for a navigational channel from Saco Bay into "The Gut" at Biddeford Pool an adequate controlling depth for the designated anchorage area in Wood Island Harbor.

At this time it is expected that the dredgings will be primarily sand and that it could possibly be applied to the beaches at Hill's Beach for sand nourishment, unless another alternate disposal area is determined to be necessary.

At the City Council Meeting of April 23, 1981, the City Council of Biddeford did authorize the Mayor by a vote of All in Favor to submit the request so stated.

If you require any additional information to initiate the work on this project, please advise me as soon as possible. I hope to hear from you in the near future and look forward to working with you on the development of this project.

Very Truly Yours,

Roger L. Frechette

Roger L. Frechette
Mayor
City of Biddeford

Enclosure: Locus Map

cc: Mr. James McMahon
Mr. Reed Rumery
Mr. David Katon